AIR DEFENSE MAGAZINE

APRIL - JUNE 1976

AIR DEFENSE MAGAZINE

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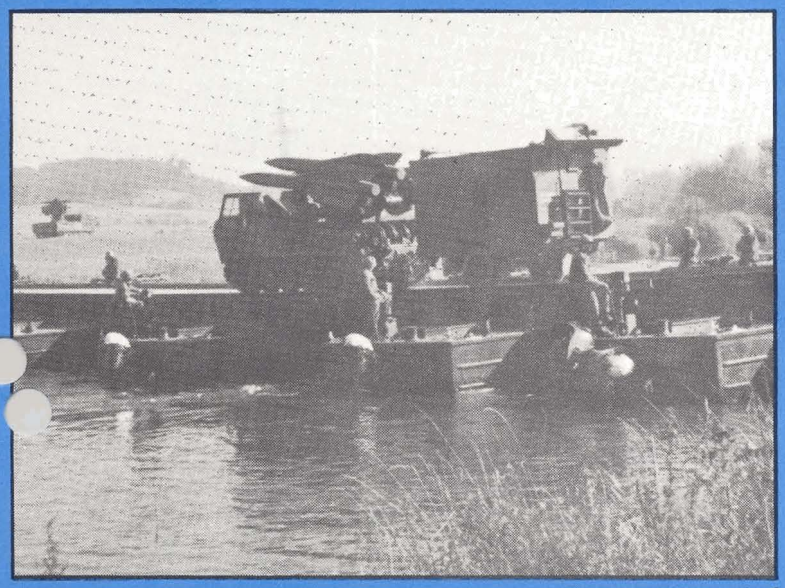
ABOUT THE COVERS: The B-52 in action on our front cover is shown crossing over a map of North Vietnam as it approaches a Communist air base protected by SA-2 surface-to-air missiles. The illustration symbolizes our lead article, "What Really Happened in The Air Defense Battle of North Vietnam," which begins on page 8.

Another feature article, "Air Defense in Reforger," page 16, is accented on our back cover as Chaparral and Hawk units are shown on the move during Reforger maneuvers in Germany.

BATTLE OF NORTH VIETNAM 8



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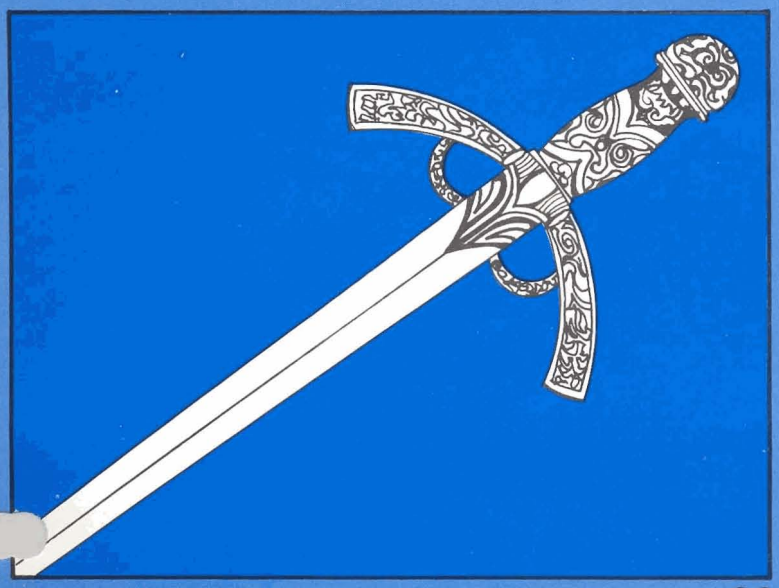

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ENGAGEMENT ZONE

letters to the editor

SOVIET DECEPTION TECHNIQUE

Dear Sir:

I would like to call your attention to another development possibly related to the article, "What Really Happened In the Air Defense Battle of North Viet nam." *(Page 8, this issue.)*

The information I refer to is contained in *Soviet Aerospace,* March 22, 1976. In that reference, Senator Robert Taft, Jr. built a rather startling case for another instance of the Soviets deliberately deploying an inferior weapon, with the idea that a sudden later addition could provide a step function advance from inferiority to superiority. This refers to the deployment of the YANKEE class nuclear submarine equipped with SS-N-6 strategic missiles. Operational in 1968, there are 34 YANKEE's today in the Soviet fleet.

However, Senator Taft points out that, during the period from 1968 until now, the Soviets have not deployed a *ballistic* antiship missile. Instead, they have deployed cruise antiship missiles, which are much more easily defended against than tactical ballistic missiles. Yet now there is a significant development of the SS-N-13, which appears to fit the launch tubes of the YANKEE submarine and which appears to be a tactical 400-mile ballistic missile with terminal homing capability.

The sudden incorporation of such missiles into YANKEE subs would represent the addition of a naval antiship capability possessed by no other nation at present. It would represent a sudden, rather formidable challenge to U.S. Naval superiority, quickly and drastically.

As you can see, the situation, if valid, is strongly suggestive of the original Soviet plan for the air defense of North Vietnam, and I believe it may well be valid.

THOMAS E. BEARDEN
LTC, AD (Retired)
Research Scientist (Air Defense)

AIR DEFENSE FOR HAWK

Dear Sir:

Each year commanders of USAREUR-based Hawk air defense units review the results of their annual tactical evaluation reports and note one recurring, common comment: "As a SHORAD weapon, the M60 machinegun is not adequate against high-speed aircraft." The fact that the statement is accurate is indicative of a problem that our Allies are aware of and needs to be addressed. Air defense missile batteries such as Hawk lack a viable defense against close-in air attack.

The most superficial examination of the battles in the Sinai during the Mideast war reveals that an effective air defense umbrella over the battlefield is a key to mobility for armor and mechanized infantry. There can be little doubt, then, that US air defense units will be key targets early in any future conflict where the enemy has an offensive air capability. Provided that all enemy aircraft can be intercepted by friendly fighters or engaged at maximum system range by Hawk and Nike Hercules, our defensive umbrella will be effective. If, however, a given area can be saturated and penetrated, missile batteries will present inviting and vulnerable targets to close-in air attack. Even the most optimistic air defender must realize that given sufficient tenacity, resources, and electronic counter-measures, any system can be penetrated. Once this has been accomplished, the air defense unit must have the ability to survive direct air attack and still carry on its primary mission.

Does economy of force rule out the use of air defense assets to protect other air defense assets? No doubt that this belief is attractive during this period of increasing economy, but it could be exceedingly expensive in a future conflict. The Hawk air defense battery is incapable of adequately defending itself from attack by aircraft within the missile dead space. Given that any mission is air defense suppression, then forcing the unit personnel to leave the equipment and move to bunkers, man machineguns, and engage high-speed aircraft would certainly meet the definition. In addition to this, our own experience in Vietnam against North Vietnamese missile sites should indicate the probable outcome of such a situation.

As a minimum, air defense batteries should be provided with an organic element of Redeye. This would provide minimal SHORAD coverage only. More acceptable would be a Vulcan platoon which has the ability to provide coverage for a deployed Hawk battery. Command and control of these systems is not a difficult problem. In fact, with the battery's organic IFF the problem of identification and control of fires would be a great deal less than the current division-based Vulcans now experience. Consideration for such a deployment of Vulcan should be given as newer AD gun systems enter the inventory.

At some point in the future, we will have to face the need that exists for short-range air defense of missile batteries. The inherent weakness presented by the missile dead space makes these units vulnerable to close-in air attack. If nothing else, the concept of SHORAD protection for air defense missile batteries needs to be tested and documented. The assets to design and test such a program are available at USAADS and Fort Bliss. The need for such a program exists now.

DAVID K. WHITWILL
CPT, ADA
Asst S3, 3d, Bn, 60th ADA

Airdefenders in Hawk units would no doubt welcome Redeye or Vulcan protection of their positions in combat. But, as Captain Whitwill asks, "does economy of force rule it out?" The answer at present is yes. The cry is now for more air defense of the maneuver units. It appears that for some time Hawk cannot count on protection from air defense units except where deployment affords mutual support.

Ed.

NCO RESPONDS

Dear Sir:

I'm not an ADA soldier but have enjoyed *Air Defense Trends* for several years now. You are doing a great service in getting the word to the troops. Even so, I offer the following for your consideration:

The senior ADA commanders' update is fine, what about doing the same for ADA sergeants major?

Could the USAADS AWTS Division provide the latest offerings on correspondence courses via a regular series? Or as needed?

I would also like to respond to "The Editor Comments" in the October-December 1975 issue. I am currently doing research for an article concerning the NCO and professional ethics. Would you be interested in such an entry for *AIR DEFENSE Magazine?*

Also, I would be pleased to do a book review for you. My area of interest is military management and leadership/command. What do you suggest?

Long a consumer, now I desire to be a contributor.

SSG ROBERT R. CORDELL
AFSOUTH Liaison Office
Turkish General Staff — NATO

Thanks for your response and suggestions. We are now looking into the possibility of adding a sergeants major update. We also plan to print correspondence course updates. Correspondence course updates are also available by writing to USAADS, ATTN: ATSA-TD-TER. We are always interested in receiving articles on military professionalism and are looking forward to receipt of your article. We'll place you on our list of those who desire to do book reviews. Thanks for your contributions to AIR DEFENSE!

—Ed.

ATTENTION VIETNAM VETERANS

Dear Sir:

As part of the Army's official historical series, the Center of Military History is preparing a volume entitled *The US Army in Vietnam: A Pictorial Record.* We are now canvassing Vietnam War veterans for pictures and would be grateful if you printed the following notice in the next issue of your journal.

"The Center of Military History is preparing a pictorial volume in the Army's official history of the Vietnam War and would welcome photographs illustrating the following subjects: Viet Cong and North Vietnamese Army activities, morale and discipline in USARV, Vietnamese life in the cities and on the outskirts of US bases, battle damage, and combat. All contributions — prints only, no slides — should be sent to

Dr. Joel Meyerson
US Army Center of Military History
Forrestal Building
Washington, DC 20314
(202) 693-5375, AUTOVON 223-5375

Thank you for your consideration.

DR. JOEL MEYERSON
Historian
Current History Branch

BEST IN USAREUR '75

Dear Sir:

Not to cheat anyone out of his just due *("3d of 61st SCORES HIGH," Oct-Dec 75 TRENDS),* but the men of Chaparral Batteries C and D of 2d Bn, 67th ADA earned the distinction of best USAREUR *divisional* TOE unit at Chaparral ASP '75 at NAMFI, Crete. In addition to the battalion score of 89.42 percent, Battery D had the highest divisional squad (96.6 percent) and the best missile assembly team (98.9 percent) in USAREUR.

Some people may consider the 2/67 ADA a part of 32 AADCOM but I assure you 32d AADCOM is a sort of foster parent in lieu of the presence of the Big Red One.

JOHN L. TABER
CPT, ADA
Commander
Btry D, 2d Bn, 67th ADA
1st Inf Div (Fwd)

MORE ON SOVIET AD WEAPONS POSTERS

Dear Sir:

I have recently come into possession of the October-December 1975 issue of your magazine and found it to be entertaining, educational reading for an aviator. Of particular interest was the inclosed chart depicting Soviet air defense weapons. This is the first time I have seen such an array of information in an unclassified form.

Since knowledge and awareness of the Soviet threat are of such vital interest to all aviation personnel, request that I be provided five additional copies of the chart. Five copies would allow me to forward a copy to each of my subordinate company-size elements. They will be used in the preparation and presentation of threat classes. Additionally, I wish to be included in the distribution of future issues of your magazine.

JOHN F. MERCADANTE
CPT, Infantry
S2, 25th Combat Avn Bn

Dear Sir:

I have just received a copy of *Air Defense Trends,* Oct-Dec 75, and the accompanying Soviet Air Defense Weapons poster. The poster is an excellent graphic teaching aid and has aroused considerable interest here in the Air Force Department and among the assigned instructors. Request, if possible, that I be sent six more copies of the poster to be placed in the seminar rooms for display and instructional use.

SHELDON A. GOLDBERG
Major, USAF
US Air Force Liaison Office
Federal Republic of Germany
Armed Forces Staff College

Dear Sir:

Thank you for the copy of the Soviet Air Defense Weapons poster. It is an excellent portrayal of Soviet weapons. I realize that it involved a great deal of effort and wish to extend the thanks of all of us involved in threat systems. I would appreciate receiving 30 copies to distribute to interested parties within the Pentagon.

Keep up the good work!

HAL BLOCK
DAMA-PPM-T
The Pentagon
Washington, D.C.

Dear Sir:

Request 15 reprints of the chart "Soviet Air Defense Weapons" which appeared in the Oct-Dec 75 issue of *Air Defense Trends.* Distribution to be made to German Air Force Intelligence units engaged in collecting against these Soviet threat systems.

KLAUS F. LOEHR
Major, USAF
Defense Attache Office
Bonn, Germany

Dear Sir:

I am the Program Planning and Evaluation Officer for the Tactical Expendable Drone System (TEDS). TEDS is a small air vehicle being developed by the Air Froce to dissipate threat air defense by escorting air attack forces in large numbers. The system is intended to dilute, decoy, and degrade a threat force's radar systems.

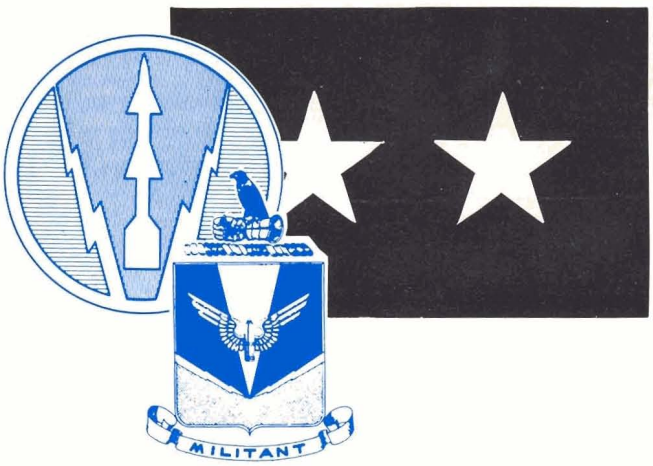
In your October-December 1975 issue is a chart entitled "Soviet Air Defense Weapons" and an article entitled "Flak Packs." These are the weapons that TEDS is intended to negate. Although the information contained in the issue would be most useful to the officers in my program office, we don't have ready access to it. The issue I read is on file at the AF Foreign Technology Division, and is not for loan.

If you have extra copies of the October-December 1975 issue, including the chart on Soviet weaponry, would you send me two? They would be most useful to the accomplishment of the TEDS program.

GREGORY W. McKILLOP
1LT, USAF
Program Planning & Evaluation Officer
Deputy for Remotely Piloted Vehicles/
Air Launch Strategic Missiles

MAJOR GENERAL COMMA

MG Robert J. Lunn passes the US Army Air Defense Center and Fort Bliss colors to CSM Avery H. Jackson after receiving them from outgoing Commander MG CJ Le Van.



Major General Robert J. Lunn was promoted to his present rank and assumed command of the US Army Air Defense Center and Fort Bliss coincident with the nomination of Major General CJ LeVan to the rank of lieutenant general with the new assignment as Director, Operations Directorate, J3, Organization of the Joint Chiefs of Staff.

In an impressive change of command ceremony involving more than 3,500 troops, the outgoing commander, MG, LeVan, passed the Air Defense Center and Fort Bliss colors to MG Lunn. MG Lunn officially took command of the Air Defense Center and Fort Bliss on 14 June upon the departure of MG LeVan for his assignment at the Pentagon.

General Lunn had served as Assistant Commandant, US Army Air Defense School, since September 1974. Others have served as both assistant commandant and later commander of the Air Defense Center and Fort Bliss, but MG Lunn is the first to ascend directly into the position.

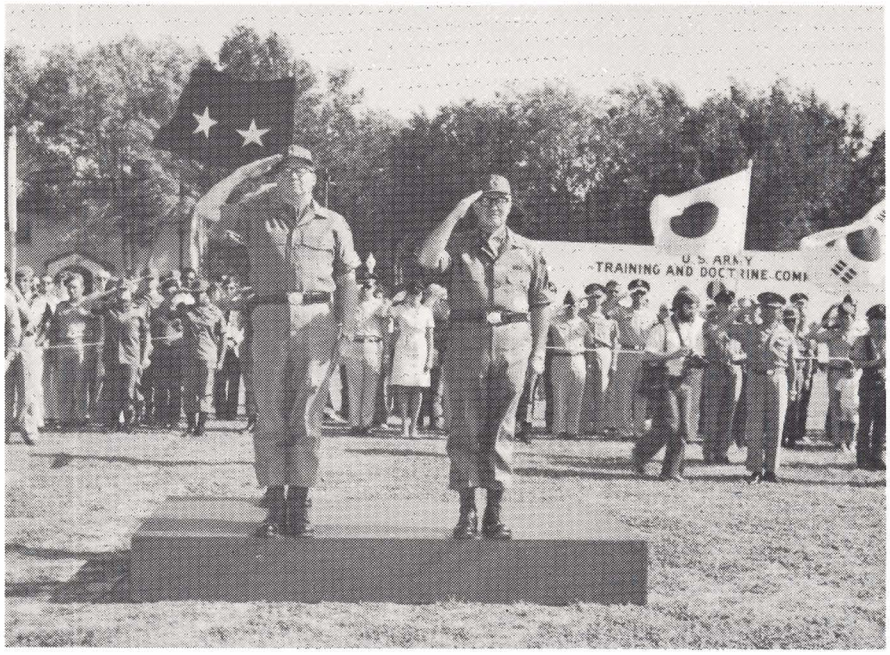
A native of Illinois, he graduated from the US Military Academy in 1950 and was commissioned in the Artillery. His air defense experience dates from that time and includes commands from battery to Deputy Commander, 32d Army Air Defense Command.

His first assignment after graduation from West Point was with the 8th Antiaircraft Artillery Battalion at Sault Ste Marie, Michigan. Following this assignment, he served in Georgia, Japan, and Colorado. In 1956, he attended the British School of Antiaircraft Artillery in Wales.

After serving in Germany with the 32d Antiaircraft Artillery Brigade, the general went on to receive his Master's Degree in Aerospace Engineering from the University of Arizona in 1961. He then joined the US Army Artillery Board at Fort Sill, Oklahoma, as Chief of the Lance Missile Development Program.

MG Lunn graduated from the US Army Command and General Staff College in 1965 and assumed command of the 4th Missile Battalion, 44th Artillery, in Korea. He later was assigned to the Office of Chief of Research and Development in Washington as Chief of

LUNN IS NEW FORT BLISS NDER



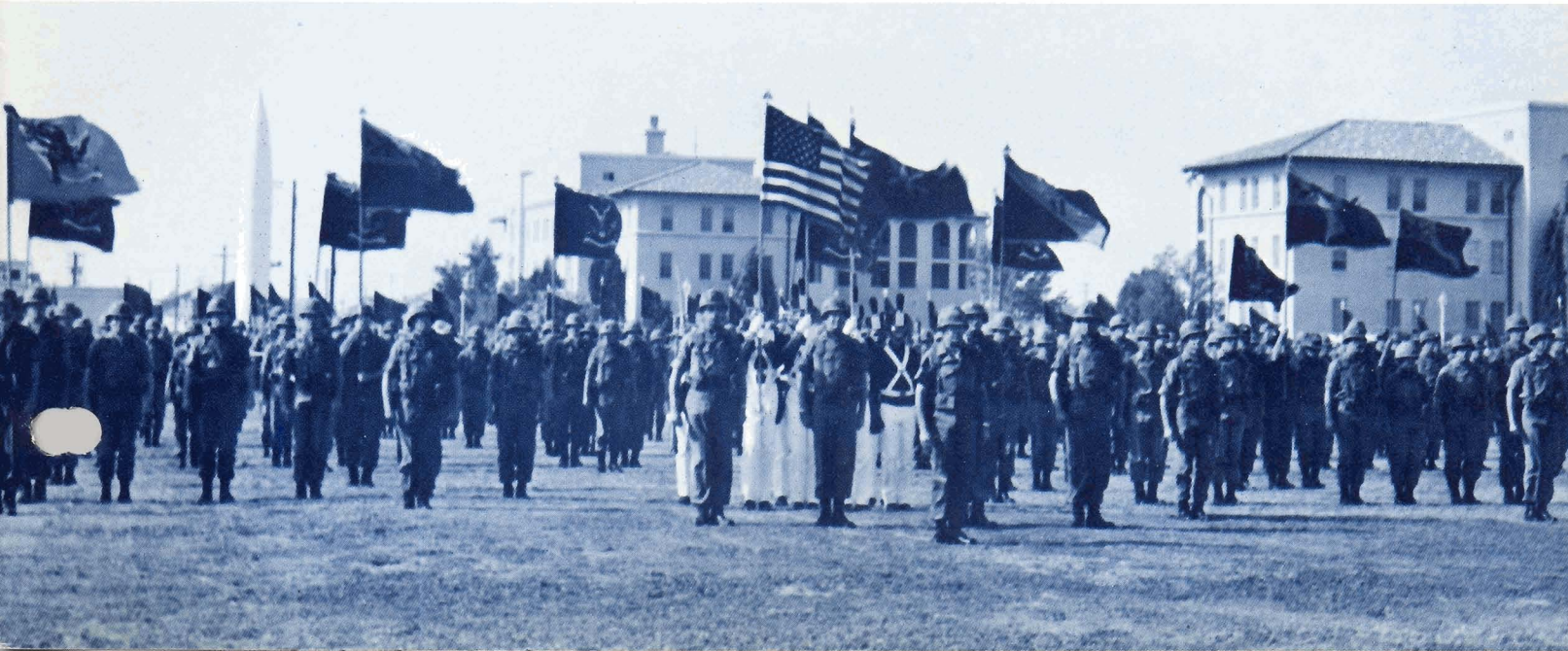
MG CJ Le Van and MG Robert J. Lunn (Left to Right) during a 13-gun salute at the change of command ceremonies.

the Air Defense and Missile Division, following graduation in 1968 from the US Army War College.

An assignment as assistant to the Secretary of the Army preceded his assumption of command of the 94th Air Defense Artillery Group in Germany in 1971. It was in 1973 that General Lunn became Deputy Commanding General of the 32d Army Air Defense Command in Kaiserslautern, Germany.

General Lunn's awards include the Legion of Merit with Oak Leaf Cluster, the Meritorious Service Medal, and the Army Commendation Medal with Oak Leaf Cluster, as well as various service medals.

Part of 3,500 troops from all units at Fort Bliss in formation on Noel Field during change of command ceremonies.



INTERCEPT A

MAJOR GENERAL ROBERT J. LUNN

The recent activation of a Basic Combat Training Brigade at Fort Bliss is making it possible for most newly recruited ADA soldiers to arrive at their units sooner. Because the new recruit now receives both BCT and MOS training at Fort Bliss, we have eliminated a change of station and reduced the time needed for administrative processing.

Further reduction in the time required for entry level training may be possible by combining some actual BCT instruction with MOS training. A limited experimental program along these lines is currently underway for 16P personnel — total training time has been reduced from 16 to 14 weeks. We will examine the results closely to determine whether similar reductions can be made for other MOS without degrading the quality of our training. In the meantime, we have adopted a modified form of self-paced instruction within the ADA Training Brigade. Approximately 25 percent of our AIT students are now being graduated either 1 or 2 weeks earlier than before.

The payoff for reducing institutional training time is twofold — lower training costs at the Air Defense School and increased productive time for the soldier on the job in his unit. To achieve such a payoff without degrading the effectiveness of our training calls for a cooperative effort between the School and commanders in the field. If the School can save resources by reducing institutional training, then those resources will be devoted to developing improved programs for unit training.

Considerable effort is now being devoted to bringing effective training to the soldier, rather than bringing the soldier to the training. The Basic NCO Course (BNCOC), for example, has been eliminated from the School's formal curriculum. We are designing an exportable BNCOC for 16P and 16R personnel to be taught in local NCO academies and thus eliminating the need for those students to travel to Fort Bliss. We are also developing plans to conduct an Advanced NCO Course in USAREUR some time next year. We anticipate that we will be able to reach more soldiers with more effective train-

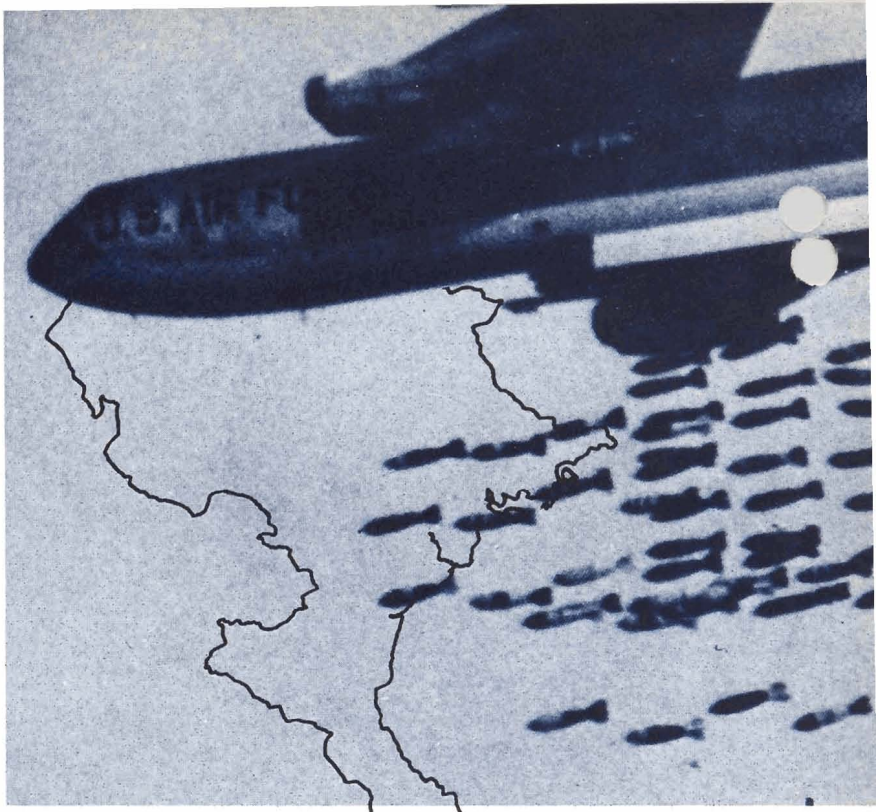
ing, aimed specifically at the needs of the local commander.

The ongoing reorganization of the Air Defense School is largely being driven by the recognized need to devote more of our attention to training that takes place away from the School rather than in it — to make the School more outward looking and less inward looking. The TEC Program is producing quality lessons for use in unit training. Our initial efforts were concentrated on operator training for the Chaparral and Vulcan weapon systems. Lessons on Redeye, FAAR, and TADDS will soon be available. Our developmental efforts are now concentrating on Improved Hawk lessons.

The ongoing development of Soldier's Manuals, skill qualification tests (SQT's), and ARTEP's represents a significant effort to provide focal points for unit training. The ultimate aim of all individual training should be to help the soldier to do well on his SQT. Likewise, the ultimate aim of all collective training should be to enable the unit to master its ARTEP. Following a validation effort this year, the SQT system will be effected for 16-series MOS in 1977. The ARTEP system is now in effect for C/V battalions and will soon be expanded to include other organizations.

The emphasis on decentralized training places a large responsibility on NCO's and officers at battery and battalion level. They must honestly assess the tactical and technical proficiency of each soldier and each organizational element under their supervision. They must then plan and implement training programs that are tailored to the specific needs of their organizations and their soldiers. This training mission is shared by the Air Defense School with all commanders in the field. I am sure that by working together we can develop both institutional and unit training programs that will improve the professionalism of our soldiers and the performance of our units.

Robert J. Lunin



WHAT REALLY HAPPEN
BATTLE OF NO

THOMAS E. BEARDEN,
LIEUTENANT COLONEL, RETIRE

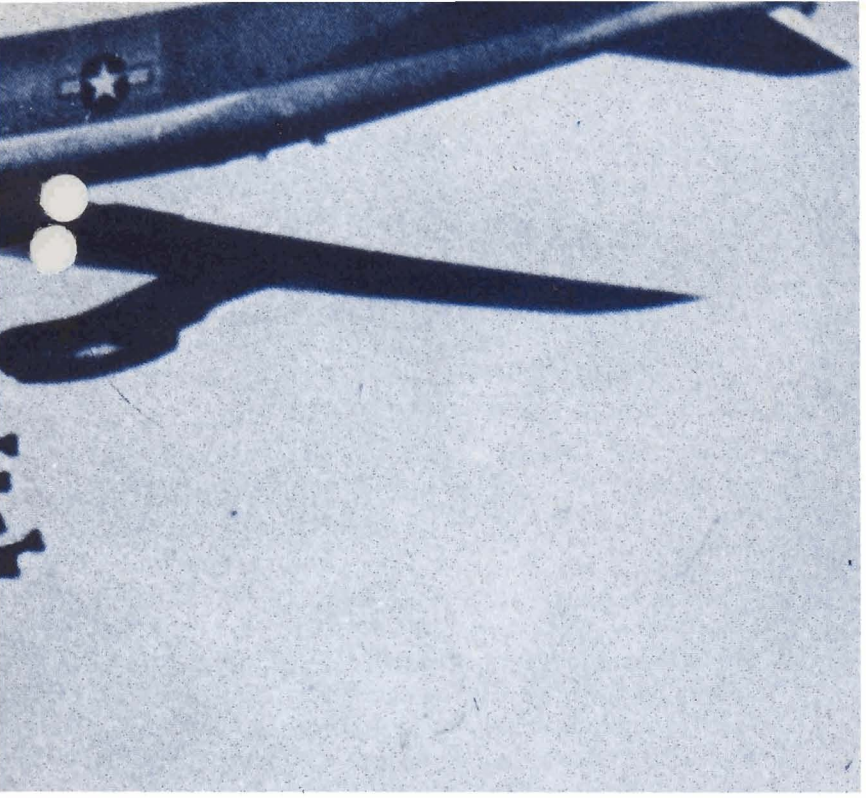
A great deal of sense and nonsense has been written on the Vietnam War, particularly on the experiences of our air forces in confronting and combatting the North Vietnamese air defense systems furnished by the Soviet Union. Unfortunately, these air defenses have often been touted as primary examples of *Soviet* air defenses, and it has been widely implied that U.S. air combat against North Vietnamese SAM's and guns can be directly translated into what the U.S. should expect in a NATO struggle against the Warsaw Pact in Europe. But, in fact, our air arm had no really serious challenge from either North Vietnamese aircraft or North Vietnamese ground-based air defenses, and it is the purpose of this article to unfold what actually happened in the air defense battle over North Vietnam and why. To do that, we must first develop the necessary background.

Early in the Vietnam conflict, and before the introduction of U.S. regular forces, the Soviet Union and Red China were locked in deep doctrinal conflict for leadership within the Communist world. One result of this doctrinal conflict was to divide the influence over the North Vietnamese into separate areas of responsibility. The Chinese essentially assumed supervision of the guerrilla war on the ground in South Vietnam, and the Soviets retained major influence over the regular North Vietnamese Army.[1]

With the introduction of regular U.S. forces into South Vietnam, and the initiation of U.S. bombing of North Vietnam, the Soviets assumed responsibility for the air defense battle, particularly over North Vietnam where it was being fought with regular North Vietnamese troops. To play safe in this dichotomy, both Russia and China contributed to the sphere of responsibility of the other so as not to lose face should the other's effort unexpectedly succeed. Accordingly, the Chinese contributed labor forces and antiaircraft guns to the air defense battle in North Vietnam and the Russians furnished supplies and materiel for the guerrilla warfare in South Vietnam.

Here, one must digress to develop additional aspects of warfare as seen through Communist eyes. First, they view warfare as total; and all social, political, economic, and psychological aspects receive as much meticulous attention as do the purely military aspects. It is my

1. It should be born in mind that Ho Chi Minh had first requested aid from the U.S. before he turned to the Soviets and to the Chinese. The North Vietnamese, in fact, had a very real need to keep both China and the Soviet Union involved so that one could be played off against the other and neither would be able to make North Vietnam its puppet state.

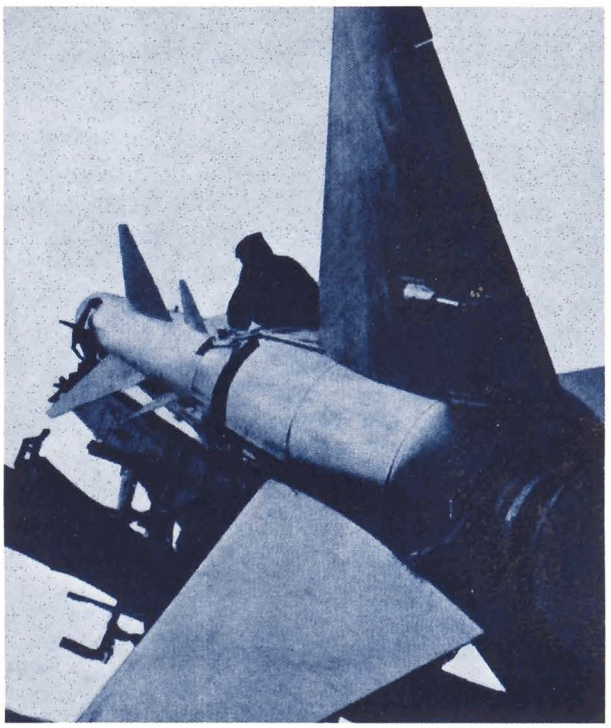


monstrously against the Judeo-Christian adage against killing and that the U.S. military and political leaders were therefore murderers and war criminals. The powerful results engendered by these provocative psychological themes were later to have a decisive effect on the entire Vietnamese war, and they even entered into shaping the conduct of the air defense battle of North Vietnam.

Further, Communist theoreticians were aware that there are essentially two overall ways to make war. First, one can fight with "big machines" and use them to decimate and destroy the enemy. The main advantage of this type 1 warfare is that when the machines of war can effectively be brought to bear, nothing can stand against them, and the war can be won in short order. The other major advantage is that it is the machines themselves that bear the brunt of the battle, and human casualties are minimized when the machines succeed in doing the job. The major disadvantage of big machine warefare is that it is extremely expensive, and it will eventually bankrupt

ED IN THE AIR DEFENSE RTH VIETNAM

opinion that the Soviet theoreticians found a vulnerability in the Judeo-Christian heritage of the U.S. and seized upon it as their primary psychological warfare theme to be strongly pushed inside the United States. That vulnerability had to do with the Christian admonishment that "Thou shalt not kill." The Communist theoreticians skillfully proclaimed that the U.S. was interfering in the internal affairs of a peaceful Asian nation, and pounded the theme that the U.S. military machine was, in fact, butchering innocent women and children with a rain of bombs and terror from the skies.[2] Several concomitant movements in the United States also were highly susceptible to this and related themes, and these groups were interacted with most strongly.[3] Thus propaganda themes were established for black dissidents that the war was unfair to blacks because far too many blacks were dying; for the "flower children" and peace movements that the war represented an overt U.S. aggression against a peaceful Southeast Asian country; for the intellectuals and university students that the real reason for this was so the U.S. military/industrial complex could make money; and for all groups the theme that the war was

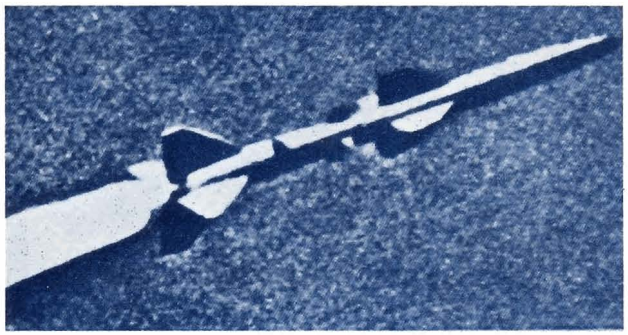


2. Women and children are unavoidably killed by aerial bombardment, but the U.S. air attacks in North Vietnam were probably the most restrained air attacks in the history of aerial warfare, particularly strategic attacks.

3. It is thus not accidental that representatives from internal U.S. peace movements and dissident organizations were eagerly granted interviews by North Vietnamese leaders and could travel to North Vietnam almost at will.

any nation that tries to sustain it too long. Another serious disadvantage is that terrain, vegetation, and weather can rather severely hamper the machines, making them much less effective in certain types of environment. With type 1 war, a nation suffers fewer personnel casualties but expends many more dollars; one must therefore quickly bring the machines to bear and win or the nation will simply be bled dry in a protracted war. Because the U.S. places a high premium on human life, it is compelled to fight type 1 war and, in fact, its citizens will not support a war of the second type. The US citizenry, news media, and Congress would demand the prompt courtmartial of any US military commander who continued to accept wholesale casualties such as the 7th and 9th NVA divisions took at An Loc in 1972.

The second way to make war is to use large numbers of men, lightly armed with machineguns, mortars, rocket launchers, etc., and simply slash and run. This is



a protracted type of warfare that weakens and drains the enemy over a period of time, eventually destroying him when he is sufficiently weakened. The major advantage of type 2 warfare is that it is relatively cheap in terms of dollars, while its major disadvantage is that is is frightfully expensive in terms of human lives. Thus it can only be used by a highly disciplined nation or force which is willing to accept large personnel losses over a protracted period of time. Another disadvantage of type 1 warfare is that it cannot withstand the heavily armed forces of a type 1 enemy if their machines can be brought to bear. Thus type 2 warfare must be conducted by highly disciplined forces in appropriate terrain, but it is ideal in the relatively unorganized, primitive nation that has few roads and highways, is sparsely settled, and contains densely vegetated areas. It happens that much of the world is in fact highly suitable for type 2 warfare. Southeast Asia, e.g., is particularly ideal. Thus in any protracted conflict in that area between type 1 forces and type 2 forces, the type 2 forces will eventually win unless the base furnishing the primary type 2 resource — human life — is either completely isolated from the area of conflict or is itself *destroyed.* In Malaya, e.g., the battlefield could be effectively isolated, since Malaya was a peninsula. In Vietnam, the only way for the U.S. to win was to destroy North Vietnam — not the industry, roads, and bridges alone, but the *people,* who were the main type 2 warfare material. It was impossible to isolate the battlefield for an area with a border of well over 1,000 miles. For type 2 war, either the ants' nest must be destroyed or totally isolated — one cannot defeat the ants by simply stamping on their trails at a distance from the main nest.

With these background concepts, one is now equipped to view the Vietnam War in perspective, not just from a Western military-political pattern of thinking.

Let us look at the air defense problem in North Vietnam through the eyes of the Russians. In Figure 1 we show what might be a summary of the Soviet staff study initailly performed on the problem. The Soviets were faced with the problem of establishing air defenses in an area where the air was already totally dominated by the enemy. In addition, North Vietnam was a small, backwoods, Asian nation which, though thoroughly indoctrinated, strongly lead, and highly dedicated, had little or no technical background, no technicians, and no experience in using complex missile systems and aircraft against strong onslaught from the air. In addition, the Soviets did not wish to simply introduce Soviet air defense troops and equipment to provide the defense by direct intervention, since that would have risked nuclear confrontation between the U.S. and the Soviet Union before the Soviets were ready. However, the air defense situation was highly unusual, since the U.S. air attack was deliberately restrained, its tactics primly tailored, and its targets severely limited. Accordingly, a two-phased plan of action was derived. In the initial phase, 2 or 3 years were needed to fully equip and train the North Vietnamese troops with surface-to-air missiles and antiaircraft guns. If the U.S. air assault should be unleashed in full fury during this period, all would be lost from an air defense standpoint. Therefore, during phase I it would be exceedingly important not to bloody the nose of the U.S. air attacker too much. Rather, initially he should be stung a bit and forced to reveal his aerial tactics and countermeasures, but only a fairly low attrition should be inflicted on him. During this same period, the North Vietnamese air defense troops would gain the best experience in the world — actual combat against a modern air enemy. The tactic of being deliberately ineffective in phase I would prevent the U.S. from releasing its air arm, quickly suppressing the fledgling NVA air defenses and rapidly destroying North Vietnam strategically. Thus good combat training of NVA missile crews could be accomplished, but the primary concern was to allow the U.S. air attacker to

survive without too much difficulty and not goad him into unleashing his strategic airpower in full fury.[4]

Accordingly, the oldest SA-2 system in the Soviet inventory was given to the North Vietnamese. This system was not effective against maneuvering aircraft, it was fairly easily jammed, very poor at low altitudes, and roughly comparable to our old Nike-Ajax system. Over a period of 2 or 3 years, the North Vietnamese would attain a high degree of efficiency in using the old SA-2. After this effort, it would be a simple matter to replace the old SA-2 system with its modern versions which are very similar but much more effective. Interceptors could simply be flown in and given to North Vietnamese pilots previously trained in Russia or elsewhere. Effective low-altitude systems such as the SA-6, SA-7, and radar-directed guns such as the ZSU-23/4 could also be quickly added with pretrained crews to seal the air against U.S. aircraft at any altitude. Thus, once the North Vietnamese crews were fully trained and ready on the old SA-2 systems and the logistical and technical bases had been established, the second phase of the air defense battle

4. It must be remembered that during the initial period, multimillion dollar airplanes with multimillion dollar avionics flew by Haipong harbor with its three-story high piles of war materiel and supplies (and ships unloading more); bypassed the North Vietnamese electrical powerplants; avoided the airfields, factories, and storage depots; and blew 50-dollar holes in dirt roads, which were promptly filled in by North Vietnamese labor forces with "coolies and shovels." Such was the nature of the restraint of the U.S. air arm during this period.

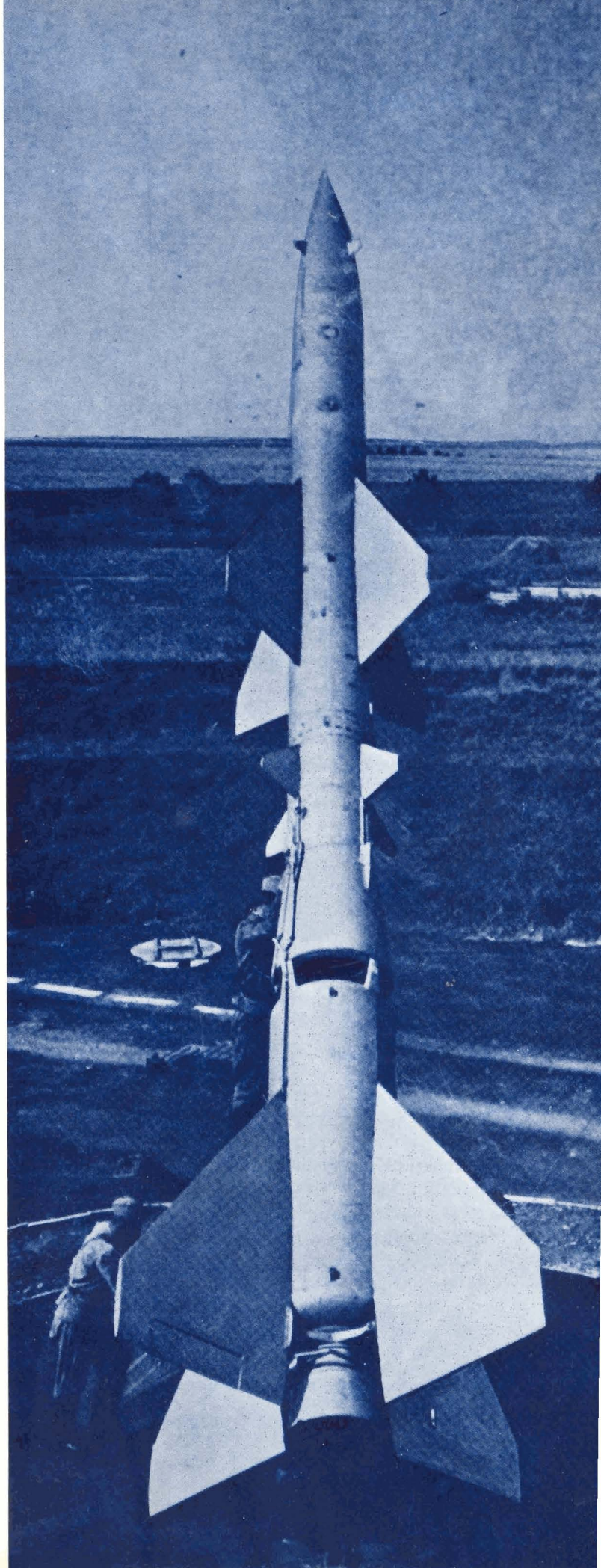
could be implemented. In this phase, the North Vietnamese air defense could suddenly go from very ineffective to highly effective in a matter of 7 days or less. The U.S. air attacker would almost immediately face a massive, modern, highly effective air defense capable of shooting him down at all altitudes, regardless of aircraft maneuver, and the defenses would be exceedingly difficult to jam or to penetrate. We shall never know how well this tactic would have succeeded, but it is safe to state that the phase II North Vietnamese air defense would have exceeded the capability demonstrated by the Egyptians in 1973, because the North Vietnamese troops became the most experienced air defense troops in the world. This highly unorthodox Soviet plan for the air defense of Vietnam would very likely have succeeded, and it would have exacted a terrible toll from the U.S. air arm. It is one more lesson in the cleverness and adaptability of the Soviet theoreticians in generating tactics tailored to fit into a single all-encompassing plan of long duration.

In the abortive Viet Cong TET 1968 offensive, the Chinese-led guerrila forces inside South Vietnam suffered catastrophic losses and were essentially annihilated. To continue the struggle, the North Vietnamese then began infiltrating regular North Vietnamese forces into the South to serve as guerrillas. The Chinese influence on the guerrilla battle in South Vietnam declined and the Soviets acquired dominant influence as the NVA became the dominant force. From this point on, the Soviets dominated the conduct of the entire struggle by the North Vietnamese forces in both North and South Vietnam. However, the ideological conflict between

China and Russia remained serious. Open conflict broke out sporadically on the territorial border between China and Russia. The Soviet Union was forced to deploy and maintain a massive, heavily-armed army on that border. Faced with the possibility, at times even the probability, of war with China, it became clearly in the Soviet interest not to evoke a massive second-front confrontation with the Americans in North Vietnam.

Meanwhile, the propaganda themes so effectively formulated by the Communist theoreticians were reaping a fruitful harvest. A rising chorus of protest against the war was raised. Large numbers of young Americans chose to evade the draft rather than fight. University professors, intellectuals, Congressional leaders, and ordinary citizens became disenchanted with the war, which seemed to offer the prospect of dragging out interminably without any real prospect of the U.S. winning or a peace being established in South Vietnam. Radical movements sprang up among the youth of the nation in emotional protest against the war in Vietnam. Daily pictures and scenes from the first war in history given television coverage showed glimpses of the horrors of war to a U.S. youth unprepared for the naked truth that war is hell, is dirty business, and has no glamor or glory. Many of them reacted strongly and predictably to the scenes of fresh graves, dead bodies, crying women, and mutilated children, and identified strongly with the innocent-appearing North Vietnamese peasants and women and children portrayed in pictures released by the Communists and flashed over U.S. television as innocent, helpless victims of wholesale carnage, death, and destruction rained on them from the skies by the U.S. "aggressor." For many young people, the War in Vietnam became the most burning issue of their time, and the Viet Cong became idealized valiant fighters for freedom of their homeland against the U.S. mechanized might. Americans are always sympathetic to the underdog, and the North Vietnamese became the valiant underdog in the war.

The students killed at Kent University by fearful, nervous young National Guardsmen who fired into a hostile student crowd provided the final spark necessary to split the nation and sharply polarize it on the issue of the Vietnam War. The reaction against the war was so great that President Johnson chose not to seek reelection, and the nation teetered on the brink of anarchy in some of its universities and on some of its streets. There was strong division between the legislative and executive branches of government, and the Congress began to insist on an end to U.S. involvement in Vietnam. One part of Nixon's presidential campaign platform was that he had a plan to end the Vietnam War. The U.S. unilaterally began withdrawing its forces under the banner of



Vietnamizing the war. The Soviets saw the U.S. giant as weary, battered, bewildered, hurt to its core, and sapped in strength. Clearly, American patience and will to continue the fighting were faltering.

Consequently, the Soviet tactics were changed. Instead of providing a second phase sharply increased air defense and risking confrontation with the desperate Americans, the Soviets equipped the North Vietnamese with large numbers of tanks, field guns, and conventional arms. They even gave them a few SA-7 missiles and a few antitank missiles. The North Vietnamese were convinced by the Soviets that a massive strike into South Vietnam by regular ground forces would succeed and the South Vietnamese forces would crumble.

As history now records, the surprise North Vietnamese attack in the spring of 1972 almost succeeded. In fact, the North Vietnamese attack would have succeeded if three NVA divisions had not been tied up at An Loc in a futile attempt to take the provincial capital. The South Vietnamese had run out of troops and had been forced to hastily pull the 25th Division out of the Delta and place it in blocking position north of Saigon. If the three NVA divisions had simply bypassed An Loc and driven south to threaten Saigon, additional on-line South Vietnamese divisions would have had to be pulled back to defend Saigon and the rest of the country would have very likely fallen. With Saigon ringed by hostile NVA forces, it would have suffered the same fate as Pnom Penh. But instead, the NVA continued to hurl violent attacks against An Loc, where a round-the-clock bombing effort steadily inflicted heavy casualties on the NVA attackers. The three NVA divisions were gradually chewed up by the defenses at An Loc, and the threat to Saigon thus failed to materialize. The massive use of American air power enabled the South Vietnamese to desperately hold on, although large sections of South Vietnam were lost to the North Vietnamese. Meanwhile the American withdrawal continued apace.

Peace talks with the North Vietnamese dragged on in endless haggling, with seemingly little progress toward peace and toward release of U.S. prisoners of war. Finally, American aircraft were briefly unleashed in December 1972 and they struck massively at North Vietnam. These air strikes were spectacularly successful, due again to the age and ineffectiveness of the North Vietnamese SAM systems.[5]

At this point, Soviet advice to the North Vietnamese was sharp and to the point. Clearly the U.S. would stop and withdraw, given a cease-fire agreement and release of the American prisoners of war. These agreements were reached in due course, and the Americans gathered up their prisoners and pulled out of Vietnam.

However, the fighting was not finished and the war was not over. After withdrawal of the Americans, the fighting continued at almost the same level. All-weather resupply roads into South Vietnam were completed by the North Vietnamese. Forward bases replete with airfields, SAM missiles, and heavily stockpiled equipment were moved inside South Vietnam itself. Heavy pressure was brought to bear on the beleagured South Vietnamese forces. History then recorded the end of the story. Weakened by unrelenting years of bitter struggle that saw millions killed and more millions maimed, left with the complex American war machinery that they barely knew how to use and maintain, bereft of hope for any other outside assistance, and with the strong feeling of having been abandoned by the Americans, the demoralized South Vietnamese forces simply crumbled, and South Vietnam fell.

So the real air defense lessons of Vietnam must be evaluated in the overall context of what happened, and why the enemy did what he did. Our Air Force did not go against the best, most modern Soviet air defenses; far from it, it went against one of the oldest and least effective. Further, this was the deliberate intent of the Soviet Union, and the purpose was to avoid goading the U.S. into all-out unrestricted air attack of North Vietnam. In addition, U.S. aerial tactics and countermeasures were evoked by the North Vietnamese air defenses, and this gave the Soviets an unparalleled opportunity to evaluate them. A great number of U.S. aircraft, air-to-air missiles, antiradiation missiles, and electronic countermeasures gear was lost over North Vietnam and adjacent territory, and this equipment must be presumed to have fallen into Soviet hands for detailed technical analysis. Soviet SAM systems may be expected to have already been modified to take advantage of this technical bonanza from Vietnam.

Another air defense lesson from the experience of the NVA air defense crews is that it is necessary to be prepared to rapidly modify SAM equipment once fierce all-out air defense battle is joined. One must also be prepared to quickly modify and tailor his tactics as well. Radiation control, camouflage, fire distribution, and discipline of fire and combat operations are not just words for lip service but spell the difference between survival or death of the SAM defenses. The use of mobility by the North Vietnamese proved so effective that it behooves the U.S. to take a fresh look at the

5. While it is true that some limited upgrading of NVA air defenses occurred, it must be stressed that this represented foot-dragging concessions by the Soviets to the North Vietnamese, who were clamoring for the more effective Soviet air defense systems in quantity.

march order and emplacement procedures and times for its SAM systems. The use of co-deployed systems, flak traps, hideout SAM's, and even the use of nonradiating SAM systems lying in ambush were demonstrated by the North Vietnamese air defense troops to be effective measures, and we must rethink our own tactics and doctrine to take advantage of their demonstrated capabilities.

But Vietnam does not provide an example of either our countermeasures equipment or our aircraft versus the most modern Soviet SAM systems, or of air operations against Soviet air defenses backed up by strong Soviet interceptor forces. Against Soviet air defenses, one must expect much tougher sledding than our pilots and aircraft experienced over North Vietnam. It should be crystal clear that the second phase North Vietnamese air defenses originally planned by the Soviet Union were never implemented.

Vietnam, in actuality, is a lesson in the cleverness of the enemy in assessing military and political situations, and in combining each separate piece into a smooth component of the whole struggle. The peculiarities of our own system, the repercussions of undue restraint on our military operations, our lack of comprehension of overall Communist strategy and field tactics, and the enemy's willingness to flexibly change his tactics in midstream are the real lessons. Air defense systems, psychological warfare themes, peace negotiations, and military operations are all integrated chessmen used by the Soviets, and they are excellent chess players.

The true role of air defense in North Vietnam must be evaluated in the total political, military, and psychological context involved. It is not limited simply to the specific events that happened in that blood-soaked land itself, and he who draws the conclusion that it is, is indeed in grave error.

THE AIR DEFENSE PLAN

PROBLEM:

Enemy totally dominates the air.

Undeveloped nation, no technicians or missile experience.

ASSUMPTION:

Direct Russian intervention not desired.

COURSES OF ACTION: DEPLOY

1. Effective systems only.
2. Ineffective systems only.
3. Ineffective systems first, effective systems later.

FACTORS:

Air attacker severely self-restrained.

North Vietnam not target rich.

Buildup and training require 2-3 years.

DISCUSSION:

1. Enemy can destroy effective systems before crews and technicians become effective.
2. Enemy can operate through ineffective systems.
3. Training with ineffective systems for 2-3 years and sudden employment of effective systems can be made to work.

CONCLUSION:

Deploy ineffective systems first, effective systems later.

Figure 1

Lieutenant Colonel Bearden, who recently retired from the Army, has contributed a number of excellent articles on various aspects of air defense during the past year. He has also written numerous papers on the science of parapsychology. His assignment before retiring was Chief, Evaluation Branch, Military Studies Division, SAM-D (now Patriot) Project Office, Redstone Arsenal, Alabama.

AIR DEFENSE

LIEUTENANT COLONEL

REFORGER is a major combined arms, joint service, NATO-controlled exercise which is conducted annually by direction of the Joint Chiefs of Staff in the Federal Republic of Germany. Although U.S. units typically constitute a substantial majority of the participating forces, REFORGER maintains an Allied, international flavor with play by British, Canadian, and German elements as well as numerous foreign observer teams both from NATO and other Allied nations.

CERTAIN TREK was REFORGER 75

Designated exercise CERTAIN TREK, the 1975 edition of REFORGER was the seventh in the series and, like its forerunners since 1970, was meant to be a demonstration of US resolve in Europe with the general objectives of sharpening combat readiness, combined arms proficiency, and interservice as well as inter-Allied planning and operations. The maneuver was staged in Bavaria from 14 through 23 October, although the planning, build-up, and phase-down extended well before and after these dates.

The scenario for the exercise had reinforced divisional forces confronting each other along a North-South FEBA with the Orange force (3d Infantry Division augmented by the 36th German Panzer Brigade) aggressing from the east against the Blue (1st Infantry Division (-), with 3d Brigade, 2d Armored Division, the 2d Armored Cavalry Regiment, and the 4th Canadian Mechanized Battle Group). The VII US Corps Headquarters controlled the game providing a synthetic higher echelon for both the Blue and the Orange adversaries. The US Air Force, Europe also played a dual role with its average of 100 sorties per day alternately functioning as friend or foe depending on direction of flight.

Air Defense Participation

CERTAIN TREK represents what is perhaps the high point of participation by Army air defense in a combined arms exercise in terms of scale, maneuver, tactics, and doctrine.

Over the years, the main air defense inputs to

REFORGER play have come from the 69th Air Defense Artillery (ADA) Group Headquarters and its subordinate units, primarily because the four Hawk battalions which the group comprises are generally disposed within the maneuver area, and because of the habitual association of these battalions with the REFORGER divisions. A similar association also exists between 69th ADA Group and VII Corps Headquarters.

Air defense participation in REFORGER has grown from a bare minimum in 1970; enlarging by 1973 to a contribution of one battalion headquarters, a fully deployed Hawk battery, and an "electronic" battery fielded with each divisional force; and culminating in CERTAIN TREK with an entire Hawk battalion in direct support of each division, a Chaparral-Vulcan battery supplementing each divisional C/V battalion, and two British 40-mm gun batteries under Blue Force colors. In addition, in 1975 the 69th ADA Group fielded a Group Control Center (GCC) which, collocated with the VII Corps Headquarters, performed an exercise function similar to the corps headquarters insofar as it represented higher air defense echelons for both Blue and Orange air defense players and monitored overall air defense play as a game controller.

AD in REFORGER: Move, Shoot, and Communicate

The wealth of air defense experience gained by elements participating in this major exercise each year can hardly be exaggerated. The locale with its breadth for maneuver, the scale of the exercise with its full combat divisions and reinforcing and supporting elements, the chance to refine through practical exercise the full range of operational routines in coordination with maneuver units, and the real-world urgency of the European context make REFORGER an unparalleled experience for the air defender.

In the category of air defense tactics, it quickly becomes apparent during REFORGER that the textbook solutions will unfold before one's eyes, provided the equipment, elements, and events are appropriately mastered. The Hawk batteries discovered, in contending with frequent requirements to relocate, that leapfrogging fire units is SOP only when the three famous artillery adages — Move, Shoot, and Communicate — are properly nurtured. Each adage had its corollary: MOVE meant MAINTENANCE, SHOOT meant SKILL, and COMMUNICATE was spelled COORDINATE.

Move = Maintenance

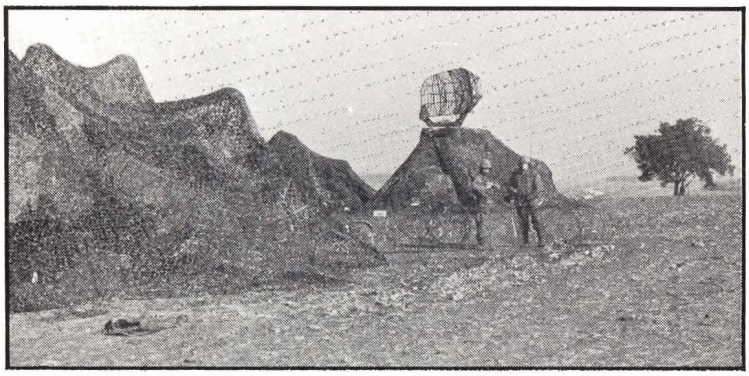
The fire units (platoons) of the 3d Bn, 7th ADA, a self-propelled basic Hawk battalion in a direct support mission to the 3d Infantry Division's Orange Force, accomplished some 42 separate moves in the 10 days of the exercise. The 2d Bn, 57th ADA, the Improved Hawk battalion in direct support of the Blue Force's 1st Infantry Division, because of configuration, moved by battery echelon a total of 13 times during the same period. Rapid, successive moves of this type demanded a top-notch, sustained maintenance posture for conventional equipment, primemovers, and the undercarriage of Hawk-peculiar equipment, all of which proved the inherent mobility of the system. It is worth emphasizing that these battalions went directly from a round-the-clock NATO operational mission into the REFORGER maneuver, unlike the divisional units which could gear up without regard to readiness status. Only a high-caliber, year-round maintenance program and a continuing effort in the field, away from the hardstand motor pool environment, enabled Army air defense to perform during REFORGER. Top maintenance was essential to maintain mobility throughout such a rigorous exercise. Similarly, only an on-going air defense weapon system maintenance program could insure sustained systems operability in such a high mobility context, especially where radar/electronic components were concerned. "Movement" meant maintenance.

Shoot = Skill

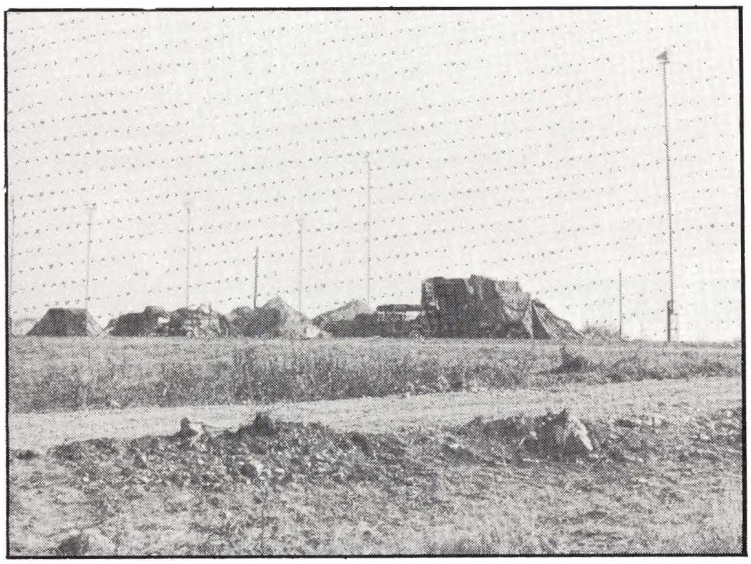
The ability to shoot was a function of skill on the part of weapon systems technicians to emplace, calibrate,

IN REFORGER

JOSEPH J. HEINLEIN, JR.



Hawk equipment of 2d Bn, 57th ADA, under camouflage nets.



Camouflaged Battery Operations Central of the 2d Bn, 57th ADA.

peak, and become ready to fire quickly and efficiently. These technical skills can come only through practice and experience and were adequate to the REFORGER environment only because they were consistently honed beforehand through on-going training with the particular system, be it Basic or Improved Hawk or Vulcan/Chaparral. In this regard, the performance of the Hawk direct support platoons was especially noteworthy. Their fully mobile shops and highly professional expertise were an indispensible contribution to system availability.

While the success of Army air defense depended upon already acquired skills by crewmen and technicians, the exercise itself provided an exceptional opportunity for the novice to gain experience and taste the austerity and pressures of the field environment. The training value of REFORGER stands high on the list of the features which commend it to Army air defense.

Communicate = Coordinate

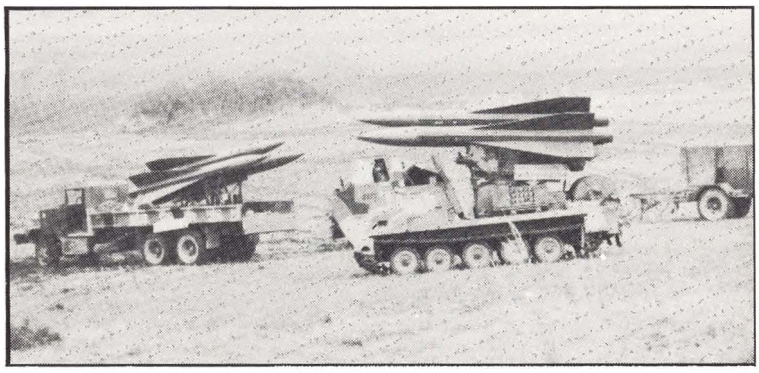
Perhaps the most profound tactical lesson learned yearly in REFORGER by the air defender is that the third leg of the seasoned artilleryman's basic adages, "Communicate," has ramifications beyond the technical and tangible capabilities of radio and wire. It means appropriate use of these capabilities for liaison and coordination as well as for fire direction and fire control. In-house coordination between and among elements of an air defense battalion or group becomes second nature and seldom creates a problem because frequent field training exercises are the "order of the day" for ADA units in Germany. But these training vehicles seldom, if ever, involve more than a single ADA battalion, especially where nondivisional Hawk and C/V units are concerned. The combined arms maneuver materializes all of the simulations an air defense battalion must normally generate on an independent FTX. Thrust into a real-world environment, battalions and batteries quickly discover the primary importance of coordination with supported maneuver elements, divisional air defense assets, and both Army and Air Force airspace managers.

During CERTAIN TREK, each Hawk battalion, consistent with its mission of direct support to a division, positioned a liaison team with the respective Division Tactical Operations Center (DTOC). In addition, the Blue Force scheme of maneuver deployed the 2d Armored Cavalry Regiment (ACR) as a covering force and refined the mission of the 2d Bn, 57th ADA to include priority of fires to the covering force. This in turn placed a 2/57 liaison team with the 2d ACR. The 69th ADA Group Control Center established close and continuing liaison with the VII Corps Air Defense Element (ADE) both for purposes of coordinating airspace management and monitoring the integration of air defense fires, as well as serving a game controller function for air defense play.

Each divisional C/V battalion established liaison with the Battalion Operations Central (BOC) of the supporting Hawk battalion. This link served to insure integration of fires, early warning through the Hawk BOC to divisional SHORAD, and represented a nascent capability to incorporate divisional air defense assets in airspace management calculations.

Army air defense coordination with Air Force elements participating in CERTAIN TREK was achieved via two avenues. The collocation of the GCC with the Corps Tactical Operations Center (CTOC) established immediate contact with Air Force liaison there. In addition, the Group placed liaison officers with the Control and Reporting Post of the 601st Tactical Control Squadron which was responsible for tactical air control with its AN/TSQ-91 system.

In the final analysis, the multidirectional communication made possible by this liaison network proved to be as good as the sensitivity to the need for coordination by those using it. Catch phrases developed: "coordinate the move to insure you get the real estate;" "coordinate to allow response to maneuver;" "coordinate for logistical support;" "coordinate road clearance;" "coordinate to be certain you can coordinate." Communications during REFORGER was surely spelled "coordination," and the chief lesson learned was that the use made of the liaison network is every bit as important as its availability.



The self-propelled launcher is employed by 3d Bn, 7th ADA.

Hawk men of the 3d Bn, 7th ADA, offloading missiles from pallet.

Air Defense Doctrine in Practice

The size and scope of a combined arms exercise such as REFORGER call for the application of practically all aspects of Army air defense doctrine. This was especially true in 1975 with the large-scale participation by air defense units. Nonetheless, three particular issues emerged from the substantial body of doctrine applied in the exercise as being the most pertinent. All three issues were related to the mission of the nondivisional Hawk battalions and their parent group headquarters, and each of the issues requires a constant effort on the part of air defenders at all levels to educate their counterparts in maneuver units.

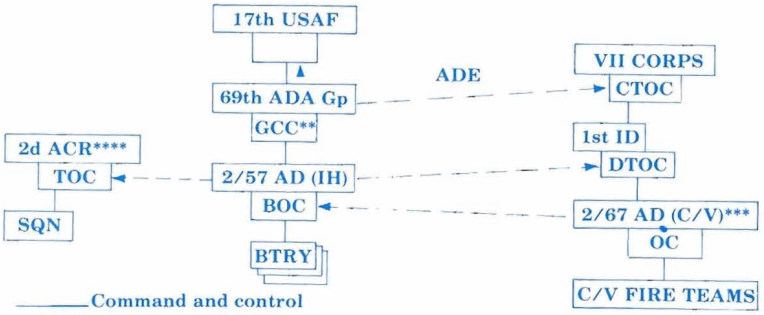
The concept of a Hawk battalion in direct support (DS) of a division was the major issue which required reclarification during CERTAIN TREK. Similarly, the second issue was the 69th ADA Group's mission (partially simulated since neither the Blue nor Orange forces actually constituted a corps) of support priority to VII Corps. In combination, these two issues generated the third: operational control of the air defense elements, who has it, when and how is it altered?

Both the air defense group and the battalion, in their respective support roles, remain under the operational control of their senior air defense command. This is a difficult doctrinal concept to convey to infantrymen whose notions of a direct support mission usually are based upon their exposure to field artillery operations.

The Hawk battalion in a DS role often is viewed by the supported division in extreme terms: either as if it were a divisional unit, implying operational control by the division, or as if it were an encumbrance occupying division real estate, hindering maneuver, and dissipating supplies. REFORGER represents a recurring opportunity to attenuate these extreme views by pointing out in practice where Hawk in direct support fits according to doctrine. In its simplest form, this is a job of salesmanship: "Here's what a DS Hawk battalion can do for you, but here's what it needs from you, and why it must remain under the operational control of the senior air defense command." In essence, infantry commanders must be informed of the utility of centralized control with decentralized execution. The strongest arguments available in selling this doctrinal concept appear to be an explanation of the need to integrate air defense fires, the necessity for economy of fire (to include Air Force weapon systems), and the complexity of the airspace management problem. Although acceptance of these notions may be hastened by clarifying the fact that the divisional C/V battalion commander remains the division air defense officer, when all else fails, it is at times useful to be able to quote the appropriate JCS publications.

Along the same lines, the doctrinal precept of centralized control of air defense assets with decentralized execution often needs reclarification in terms of the air defense group's mission, vis-a-vis the corps. The issue evolves along much the same lines indicated above with regard to the Hawk battalion in

BLUE FORCES



**GCC was collocated w/CTOC

***2/67 C/V was reinforced with additional C/V battery A/2/60

****Liaison to 2d ACR was maintained only during covering force phase

direct support of the division, but has an added dimension which can be potentially abrasive.

In REFORGER, the 69th ADA Group with its mission of priority of support to the corps is the nearest thing the corps headquarters has to an integral air defense capability. Consequently, the ADA Group Commander emerges as the senior air defender and therefore the most appropriate candidate to serve as air defense advisor to the corps commander, which in fact he does. In this capacity it is essential that he be a diplomat in dealing with the divisions on matters related to air defense because of the two hats he wears. As group commander, the DS Hawk battalions are subordinate to him; as AD advisor at corps, he has a channel to influence air defense operations even insofar as they apply to the divisional air defense assets. This latter function appears in very practical terms with the formulation of an integrated corps air defense plan.

Again, as a practical matter, the potential for displeasure by the division in viewing these functions as somehow usurping its prerogatives related to employment of air defense assets is essentially avoided in two ways. The first is a measure of common sense and diffidence by the ADA group commander in his relationship with the divisions. The second, and more visible means, is by advising the corps commander through his G3, thereby clearly defining this advice as staff input. This relationship is formalized organizationally by the presence of an air defense element in the corps G3 shop, manned by liaison personnel from the ADA group headquarters.

The very fact that these relationships were established and proved viable during CERTAIN TREK testifies to the success of REFORGER exercises over the years as a vehicle for putting Army air defense doctrine into practice and as a forum for explaining the too-seldom understood basis for the necessary retention of operational control of air defense units at the highest practicable levels.

Lessons Learned

In every military exercise conducted around the world, one of the major objectives is to determine those things that went wrong and why; then document them, determine how to correct them, and finally, reflect those corrections in training programs. As did everyone else, the air defense forces of the 69th Group learned some new lessons and relearned some old ones.

At the start of the exercise, the Orange Forces began the maneuver play with a crossing of the Main River near Sommerhausen. Because the Hawk battalion in DS of the Orange Forces placed a less than aggressive liaison officer at Force headquarters, he did not learn of the crossing until it was underway and thus lost a valuable opportunity to teach the Force commander the value of Hawk in defending the bridgehead. Although divisional C/V assets were employed, they were not backed up by Hawk. On the other hand, the liaison team with the Blue Forces was so aggressive in its search for information that, although Hawk batteries were well forward to defend the covering force, they were able to execute timely moves to the rear and avoid any threat of capture simply because they had up-to-date information on the front line trace.

Although communications worked throughout the exercise, ADL transmission was sometimes slow in being established because the abilities of the batteries in profile analysis and azimuth determination were weak and created line-of-sight delays. These deficiencies were overcome early but surfaced the need for a renewed emphasis in communications training. Notwithstanding the battalions communications shortcoming, the direct support signal assistance from Company B, 11th Air Defense Signal Battalion, was truly outstanding. The Company used six tactical relay jump teams consisting of three men each. As each battery and battalion operations central moved, these personnel performed a detailed topographic profile to determine if relays were necessary. When necessary, they established the required relays and operated in the field until they were no longer needed. The company commander stated unequivocally that this exercise provided the most realistic test of tactical communications engineering he has ever experienced.

In discussions with Air Force pilots during the exercise, they often made mention of the neatness and orderliness of the Army. They were referring of course

——— Command and control

— — — Liaison

**GCC was collocated w/CTOC

***3/67 C/V was reinforced with additional C/V battery B/6/56

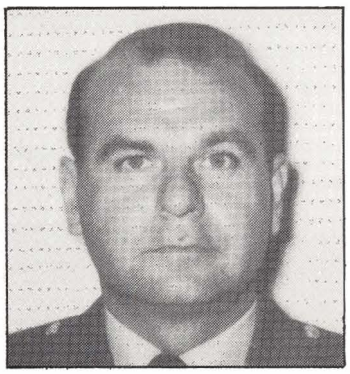
to tanks in column, easily identifiable convoys with uniform spacing between trucks, field artillery batteries with guns in neat rows, *and Hawk batteries with radars grouped and launchers on the perimeter of the battery site.* As air defenders, we must determine ways to vary battery configurations to make them less identifiable to pilots flying at 700 mph.

Although the firing batteries did a remarkable job of maintaining their equipment in an operable condition, by the end of the exercise it was becoming apparent that the absence of extended maintenance periods was beginning to be felt. The constant moves, the mud, the bad roads, and the weather were having their effect on both men and equipment, particularly the continuous-wave radars. We must develop a maintenance program that makes provision for battery or fire unit shut down and movement into woods or buildings to facilitate deep maintenance at more frequent intervals than that scheduled during normal site operations.

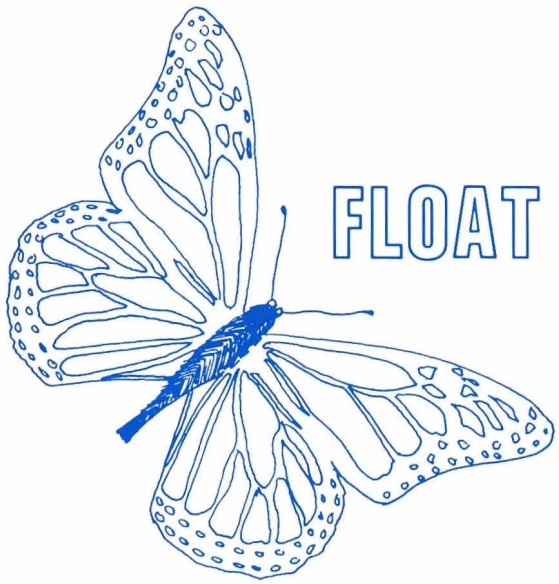
Battalion configurations play an important role in the defense provided the divisions. The 3d, Bn, 7th ADA is a self-propelled three-battery battalion consisting of nine fire units. When deployed across the division front, its fire power and coverage were excellent. The 2d, Bn, 57th ADA is an Improved Hawk four-battery battalion of four fire units. In addition to the difficulty in explaining why two battalions have such unequal firepower to the Corps Commander, the supported division could not be adequately defended. There is an immediate need for the deployment of the Improved Platoon Command Post to all Improved Hawk battalions.

Finally, the interface for early warning between Hawk units and the organic divisional air defense assets was less than adequate. Due to the lack of a common family of radios from the Hawk BOC down to the Redeye fire teams, early warning information could not be provided in a timely manner. The AN/GRC-106 radios used by the liaison team at the Hawk BOC, though having adequate range, were not reliable. Consequently, information was passed to the C/V AADCP over AM radio and from the C/V AADCP to C/V fire units and Redeye gunners via FM radios. The FM radios, though reliable, do not have the distance capability required for such a mission in view of the large frontages experienced during REFORGER 75. The necessity for real time early warning from the Hawk BOC down to the C/V and Redeye gunners dictates the urgent need for common reliable communications down to the lowest level of air defense. One inexpensive early warning device might be the employment of "bleeper" devices such as those in common use by police, doctors, and some business executives. They would serve the Redeye crew only as a warning that enemy aircraft were approaching.

In summary, REFORGER is undoubtedly one of the finest opportunities available today to test tactical and doctrinal air defense concepts, to gain practical experience for air defenders in a combined arms environment, and to demonstrate to commanders at all echelons exactly what air defense artillery can do for them on a modern battlefield. We should strive to create and to take advantage of such opportunities worldwide. Wherever and whenever ground forces maneuver, there is a proven need for air defense and it is incumbent upon us to sharpen our ability to satisfy the need, candidly recognize shortcomings, and aggressively overcome them.



Lieutenant Colonel Heinlein is a graduate of Duquesne University. He holds a Ph.D. in International Relations and a Masters Degree in Area Studies, Far East, from the American University; also a Master of Military Art and Science from the Command and General Staff College. He has served as Instructor in Chinese and Assistant Professor, Department of Social Studies, at the US Military Academy. His foreign service includes both China and Vietnam. He has authored numerous major articles and studies that have appeared in leading military and civilian periodicals and books. Currently, Colonel Heinlein is Executive Officer of the 69th ADA Group.



FLOAT LIKE A BUTTERFLY —STING LI

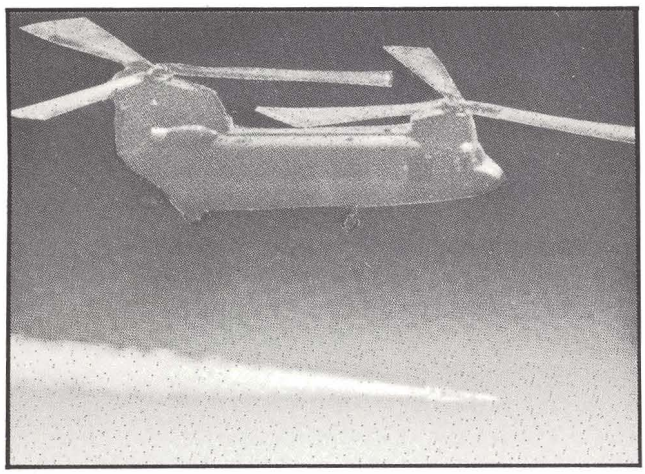
CAPTAIN DUNCAN

*Originally published as "Agility Gives Air Defense More Bite" in **Army** Magazine, September 1975.* *Copyright 1975 by the Association of US Army and reproduced with permission.*

The prize fighter who made the phrase "float like a butterfly, sting like a bee" famous is well-known for his extraordinary agility and lightning-like punches. Agility and a lightning punch are also necessary for any air defense system on today's battlefield.

At present, US forces employ two methods of countering enemy air activity. The Army provides defense of both area and point targets [critical assets] using surface-to-air missiles (SAM's) and guns. The Air Force, Navy, and Marine Corps employ high-performance jets to seek out and destroy intruders. Lt. Cdr. R. H. Klippert, Jr., US Navy, in an April article in "Proceedings" of the Naval Institute, suggests an alternative air defense method.

Major advances have been made in air-to-air missile technology. Two missiles — the Hughes AIM-54A Phoenix and Raytheon AIM-7F Sparrow — have shown spectacular capabilities. Cdr. Klippert suggests mounting these weapons on large helicopters as an alternative to STOL (short takeoff and landing) fighters on the Navy's new sea control ships. He makes an excellent case for this combination from the standpoints of effectiveness and availability, as well as in terms of cost.



How does this suggestion for a naval system affect the Army? Significantly. A helicopter missile platform offers tremendous additional capability to our front-line air defense forces. There are several principal advantages to such a system:

- The first two are interrelated — mobility and weapon range. Hawk and Chaparral/Vulcan fire units move overland to provide area or point coverage. A heliborne system moves much faster above ground, allowing it to guard a larger area or multiple points (if backed up with a suitable surveillance radar system like the upcoming airborne warning and command system (AWACS). The range of the Sparrow or Phoenix is greater than 20 miles. Combined with aircraft speed and endurance, a ground commander can expect a significant improvement in the total area actually defended.
- Another advantage is the system's capability to shoot while moving from one principal orbit area (comparable to a firing position) to another. Newer ground systems will have some snap-shooting capability, but not one quite like that of a heliborne system.

This capability would be especially appropriate in airmobile operations, movement to contact, pursuit, and screening.

- A heliborne system is also comparatively cheap. The potential platforms, CH-47's or CH-53's, are proven aircraft. The Sparrow and Phoenix missiles are both in service, as is the required AWG-9 airborne radar. The aircraft would need only three principal modifications if prepackaged avionics were used: a radar screen installation, missile rails and their associated wire packs, and air conditioning for part of the cargo area. The last modification is necessary for operation of the AWG-9 radar installation. By using

KE A BEE!

. STEWART, JR.

stowable screens, only a small part of the cargo deck need be air conditioned. Development costs for the system would be negligible when compared with the costs of the aircraft, weapons, and radar.

In November 1973 tests, six Phoenix missiles were launched against as many drones. One AWG-9 simultaneously directed the missiles in this engagement to an impressive success — two drones were destroyed and two damaged. New missiles like SAM-D will have this capability, but we will not have SAM-D for many years. A battery of heliborne missiles would have comparable ability to engage and destroy enemy aircraft, and we have it now.

What are the disadvantages of such a system? Not many. Crews would need additional IFR (instrument flight rules) training; and some cargo capacity would be lost if only aircraft in the present inventory were used, although with a prepackaged radar system the aircraft could fly cargo missions if the situation permitted.

We also might have to deploy a few more instrument landing systems to allow all-weather activity around forward area refueling and rearming points.

What about the Air Force? Would a heliborne system infringe on its "roles and missions?" This is doubtful. Army air defense forces represent economy of force for the Air Force commander.

Improving coverage with Army helicopters frees a number of high-performance aircraft for other activities. It also allows the Air Force commander to take his counter-air activity deep into enemy territory — and, from the Army's viewpoint, the deeper the better.

A heliborne air defense system would not be a panacea. It should be integrated into our existing system, perhaps on the order of one or two battalions per corps. In whatever configuration, such a system appears to be ignored. Those in air defense research and development should make contact with appropriate opposite numbers in the Navy. A multiservice development and procurement scheme would help reduce costs even further.

A heliborne air defense system won't streak along like a jet or trundle along like a tracked vehicle. It would float in our biggest ocean — the atmosphere. Its weapons, whether Phoenix or Sparrow, would pack a tremendous sting. Shouldn't we "float like a butterfly and sting like a bee?"

Captain Stewart is a Military Intelligence officer with previous experience in the Infantry. Besides his service in the Continental United States, he has served in Germany, Korea, and Vietnam. He is currently assigned to the ROTC Detachment at the Georgia Institute of Technology.

The proposed helicopter weapon system described in this article is conceptual in nature. The aspects of technology, economics, and air defense tactics do not reflect current doctrine or the position of the US Army Air Defense School. Adoption of the proposed missiles and requisite sensors for use on a helicopter would involve technical problems. In addition, such a system may not be as economical as the article suggests.

This article is adapted from General Melner's address to the graduates of class number 2-75 of the Air Defense Artillery Officer Advanced Course.

THE ROLE OF

Brigadier Ge ra

We are tremendously excited about air defense at Fort Carson. There is a new momentum and vitality in air defense today, and with this new thrust in air defense, there is a great challenge and a real personal responsibility for air defenders. Today's Army needs air defense to survive on the battlefield. This perception goes back several years and was given a shot in the arm by the Mideast war.

At Fort Carson, we have realized this perception out on the ground where air defense is integrated with tanks, infantry, artillery, and our supporting elements. We recently completed the validation of the first air defense ARTEP at Fort Carson. Air defense with a maneuver force is dynamic and urgent.

Air Defense in the Division Today.

Air defense of our field forces is an integrated effort. The functions and capabilities of various weapons give rise to what our C/V battalion commander calls the echelons of air defense. The principle of defense in depth applies perhaps more to air defense than in any other military defensive situation. It is the collective efforts of all the air defense weapons that will give our field forces the defense against attacking aircraft that they need.

The first echelon of air defense involves the basic discipline of a soldier. That is, the tank that parks in the shadow of a tree rather than out in the open, the soldier who walks along a tree line rather than across an open field, etc.

The next echelon consists of the individual and crew-served weapons of our infantry, armor, and artillery units. At Fort Carson, we have been successful in teaching our riflemen and machinegunners to effectively engage aircraft. We use the radio-controlled model aircraft and our infantry platoons, with their organic weapons, knock those model airplanes down time and time again.

The maneuver units also have Redeye as an organic weapon. The Redeye can also be a successful echelon of air defense. In fact, it affords the maneuver commander an opportunity to influence the air defense situation in his battalion area.

Beyond these weapons, we have the organic Chaparral/Vulcan (C/V) battalion which is a part of each of our divisions today. The C/V's organize to defend the most critical assets of a division based on the division commander's priorities.

Overlying all of this is the umbrella of Hawk, and hopefully Hercules, to give our air defense depth and variation in weapon systems and thus the ability to defeat enemy air, his tactics, and his ordnance.

Each of these echelons must be intact and viable if our maneuver commanders are to have the freedom to fight without excessive concern about the threat from the sky. The C/V ARTEP takes these factors into account. The ARTEP is basically a realistic test in a tactical environment with the emphasis on combined arms and maneuver. The scope of the test at Carson included 7,000 men and over 1,100 vehicles and a reinforced brigade as a background to test the unit. We also had a division tactical operations center to realistically control the operations of the C/V battalion. Our unit went through a test of six phases of air defense missions corresponding to classical attack, defense, and delay situations. In those phases they defended roads, critical assets, and maneuvering forces. One of the high points of the test was a Vulcan unit in defense of a fast-moving mech and armor task force. The sight of the Vulcans and Chaparrals maneuvering with tanks, infantry, and artillery was a rewarding one — both to the air defenders and to the other members of the combat arms.

This was an educational and arduous test. Let me touch just briefly on some of the important results. As you are aware, the ARTEP requires live firing. We are fortunate to be able to fire both Chaparral and Vulcan at Fort Carson. However, the Chaparral safety fan is so large that it shuts down a major portion of our maneuver area, therefore, we did not fire Chaparral during the course of the ARTEP. Tactical firing of Chaparral was conducted separately at Fort Carson. Two platoons of Chaparral uploaded missiles in a tactical assembly area, marched to a critical asset defense position, set up, and engaged ballistic aerial targets in a tactical environment. One of the Chaparrals from D Battery performed the "hipshoot." This track moved while loaded with a live missile, received a warning on the radio, stopped, prepared for action, and then engaged a target in a minimum of time.

But back to the ARTEP. We did make extensive use of live Vulcan firing integrated with the maneuver activities of the test. We put platoons from each of the Vulcan batteries in a simulated critical asset defense in a tree line facing our large impact area. With camouflage and dispersion, as you would have in combat, they successfully engaged both model aircraft and the ballistic aerial targets. They were also exposed to a very demanding night firing exercise where platoons were brought to a designated location and then the tracks of the platoons, one at a time, were run through a night ground firing course where targets popped up and were illuminated by a flash of light. The Vulcan gunners also impressively engaged these targets.

One of the most important considerations of the exercise was the need to get away from the sterile firing line, with 90 evaluators hovering around, and fire while in a realistic tactical deployment. That's what you will do in combat; that's what you must do in training. It is all right to master shooting by the numbers, but after your crews have learned, they have to learn to do it quickly in a combat environment.

An important lesson learned from the ARTEP was the integration of air defense and the maneuver force. One of the strongest messages to come out of the ARTEP was the requirement for air defense in the combined arms maneuver force. Air defenders at all levels, squads through battalions, must be able to enter the radio net and understand the scheme of maneuver and the graphics that go with it. They must be involved in the development of a battle plan. Platoon and task force air defense commanders must be able to check in with their supported units and in a rapid and effective way join that force and support it with their men and equipment.

This leads me to another important lesson learned from the ARTEP. You have to get your mechanics, your parts, and your commo people up front where the action is. This particularly applies to such things as your PLL; it can't be on a shelf back at battalion. When that Vulcan quill shaft breaks, there has to be a spare right there, and there has to be a mechanic to diagnose the problem and install the new part. In other words, air defenders have to be able to feed, fuel,

AIR DEFENSE

Sin ir L. Melner

maintain, and fight up front where the fight takes place. This is a demanding environment, especially when you consider that many of those track commanders and section chiefs are not SGT's or E-6's, but are SP4's and acting jacks. But they are of good quality and, with good leadership, they can do the job. In the ARTEP they did everything we asked of them and more. We were pleased to learn that four of the young men at Carson had the highest MOS test scores in the Army. The assets are there. It is up to leadership to insure that those assets form a solid air defense.

In talking about the ARTEP, perhaps it is even more important to realize that not only are the air defense units taking ARTEP's, but all of our combat units throughout the Army are now tested in air defense. Infantrymen are required to shoot their small arms effectively in the air defense role and the Redeye sections are tested as part of their ARTEP's. The unit commanders know this and they know that they can't pass their unit tests without adequately performing the functions of air defense. This gives air defense leaders an open door to teach air defense. We have a whole generation of officers today who have never been attacked from the sky, who have never been in a unit where air defenders were present as an organic part of that unit.

On the other hand, air defenders must talk the language of the tanker, the grunt, and the cannoncocker. When operating with tanks and artillery that shoot and scoot, you have to know what they are doing. That requires a high degree of combat arms professionalism on your part, whether you have Chaparrals and Vulcans supporting a fast-moving mechanized armor force or are putting that Hawk umbrella overhead. You have to know the signals and what your teammates are going to do as well as your own specific job. This leads me to a point I want to stress. Air defenders have a tremendous amount of individual responsibility and autonomy. That lonely Chaparral on a hillside 2 or 3 kilometers from the nearest air defense — the Vulcan platoon on a critical bridge — the Hawk battery far from its battalion headquarters — those Chaparral/Vulcan task forces spread across 40, 60, 80 kilometer division fronts many miles from battalion; these units are very much on their own. Factors such as time, distance, logistics, communications, and air defense command control present unit leaders with an immense challenge and great individual responsibility. The young air defenders that we have coming into the 4th Infantry Division are superb and they meet these challenges every day.

Logistics and Technology.

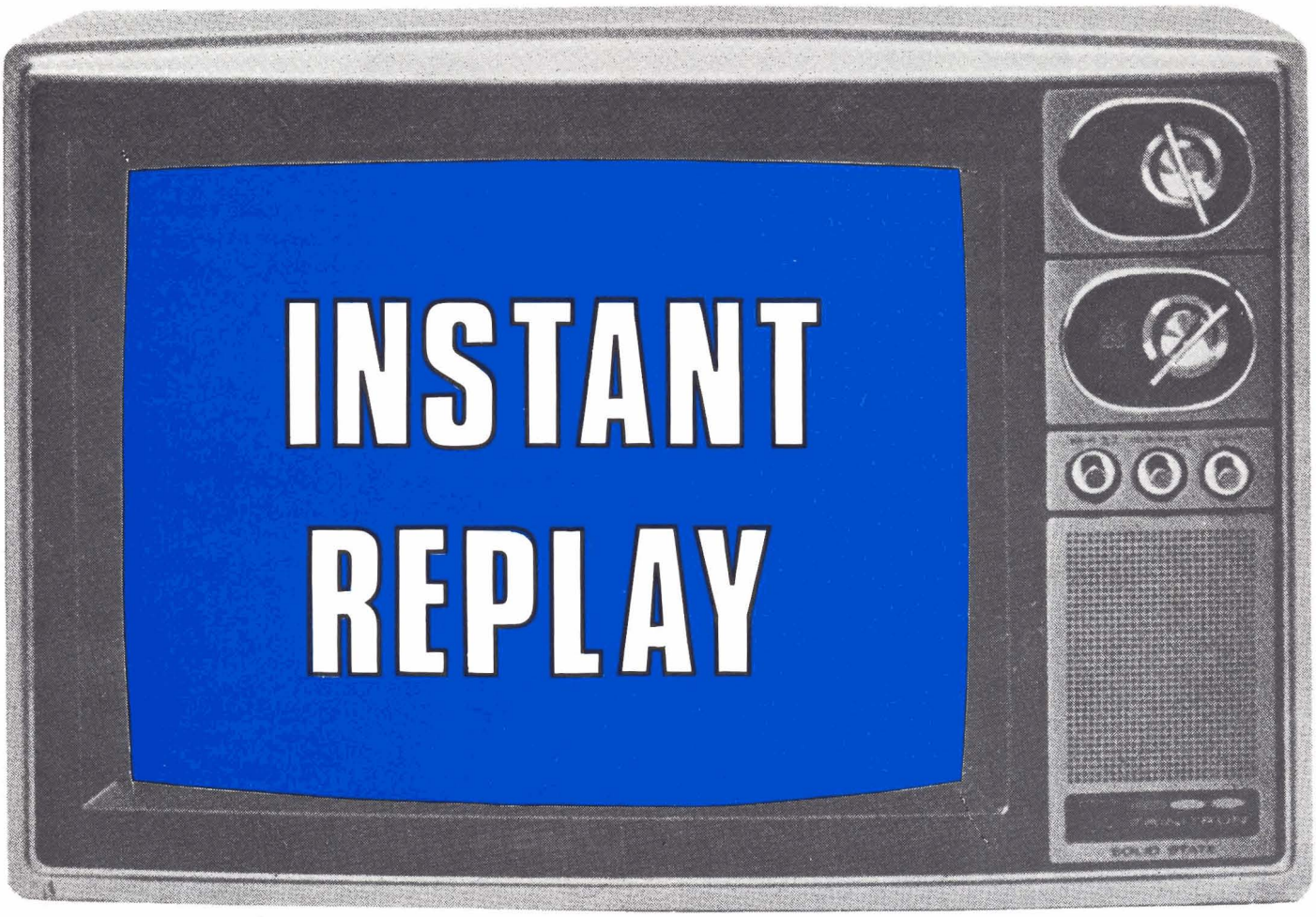
Today in the US Army, a very significant percentage of our research and development and our procurement efforts are pointed squarely at air defense and the improvement of our air defense forces in the field for tomorrow. The logistics involved in air defense activities are critical. As Assistant Division Commander of Support, I am distressed by the amount of ammunition that a Vulcan battery can consume — literally truckloads of ammunition in a few seconds of firing. Yet we have to have it. The same is true for the Hawk, Chaparral, and Hercules missiles.

Another logistics consideration is the cost of maintenance. For example, it costs a quarter of a million dollars to put each Chaparral or Vulcan on the line. As a result, there are APC's, tanks, and aircraft that will never be part of the inventory because the money was spent on air defense. Air defense is expensive, and in these days of extreme austerity and limited force structure, we have to get every ounce that we can out of the elements that are placed in that structure. The cost of radar components for the Vulcan in the divisional environment is phenomenal. Automotive parts, especially tracks, escalate almost daily the cost of having a Chaparral/Vulcan battalion as part of our force. There are new air defense systems coming on line in the future that will be even more expensive and more demanding with respect to our limited force structure. Another concern is high technology. Air defenders are, and will continue to be, armed with the most sophisticated and technically complex weapons in our inventory. Therefore, your abilities are taxed to assimilate and be proficient in the complex systems on the one hand and to exemplify a combat arms professional on the other. The commitment that the Army is making to air defense in dollars and resources places the spotlight squarely on each of you. It demands in return from each of you a total commitment to give the army the air defense it so urgently needs.

The Future of Air Defense.

Are we excited about air defense because it is a toy returning to the field after a long absence? Certainly not! The issue is the threat. The thousands of modern, capable aircraft sitting on runways of the Warsaw Pact nations are absolutely real — they exist. And in a fight they are your responsibility today, tomorrow, and in the future. New systems are coming — Stinger to replace Redeye, Roland for Chaparral, the new gun system for Vulcan, and of course, SAM-D. I think we all hope we can get that one across the goal line very soon. All these factors collectively indicate to me a bright future for air defense. You have the challenge to provide the air defense the Army must have in a modern environment. Each of you has a specific individual responsibility to shape the new air defense, to work in concert with the other combat arms, and to provide the leadership for our air defense units in the field.

Brigadier General Melner is Assistant Division Commander (Support), 4th Infantry Division (Mechanized). General Melner graduated from the Command and General Staff College, Armed Forces Staff College, and National War College, and completed graduate work in International Affairs at George Washington University. This background, along with his extensive command and staff experience, makes him eminently qualified to judge and comment on the importance of air defense.



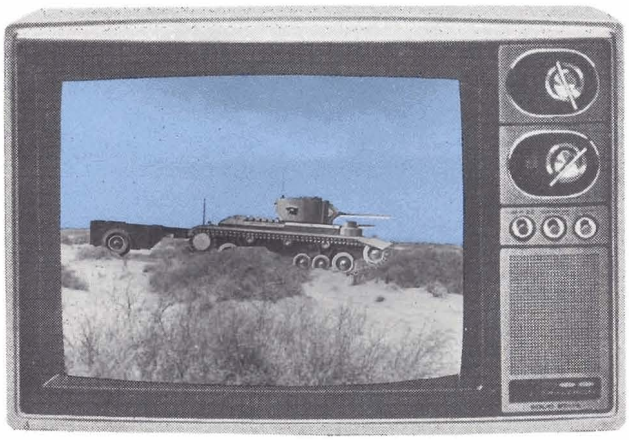
CAPTAIN MICHAEL FARRELL

When a halfback cuts through the line and scrambles for the winning touchdown in the Super Bowl, we all perch closer to the TV in anticipation of the "instant replay." The replay will reveal how the runner was able to accomplish his feat. Using the same video technology, performers in many fields (from sports to acting) use replays to view their actions and learn from them. By looking at their performances, they can observe their strengths and weaknesses and hopefully gain an insight that will help them solve the problems they are having.

What if we could apply this video technology to solve problems we are having in air defense today? By taking "instant replays" from history, we *can* find solutions to some of our problems. Take for example the problem of ammunition resupply for our Vulcans. The problem was accurately stated by BG Sinclair L. Melner, Assistant Division Commander (Support), 4th Infantry Division, when he recently said, "I am distressed by the amount of ammunition a Vulcan battery consumes — literally truckloads of ammunition in a few seconds firing." Let's look at some instant replays.

Instant Replay No. 1:

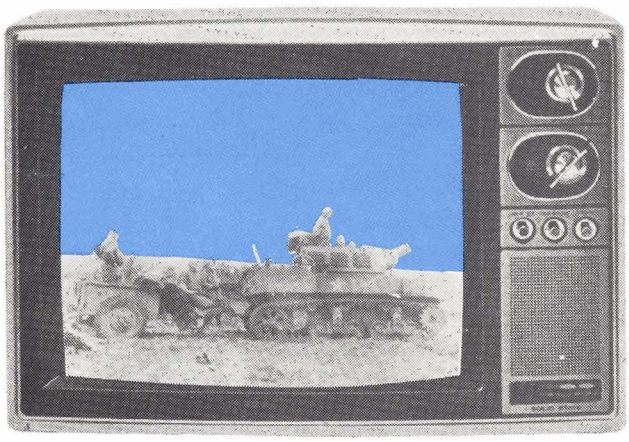
The Scene: North Africa, 1943. The British have equipped their Valentine tanks with an ammunition-fuel trailer to help solve their resupply problems.



TANK, Ballantine Books (Macdonald and Co. LTD)

Instant Replay No. 2:

The Scene: Alsace-Lorraine, 1944. American artillerymen have equipped their M-8 75-mm Howitzer motor carriage with an ammunition trailer to curtail shortages during their continuous bombardment of German positions.



Instant Replay No. 3:

The Scene: Korean War, 1952. American air defenders have hooked a trailer to their M42 Duster to carry extra ammunition for their twin-40-mm guns.

In view of these replays, why don't we experiment with trailers that can be towed by our self-propelled Vulcans?

The Vulcan carrier has sufficient power and is equipped with a standard trailer hitch. It is, therefore, capable of towing either the 1 ½-ton cargo trailer with 2,000 rounds of ammunition or the M332 ammunition trailer with 2,000 rounds of ammunition. I recommend that the 1 ½-ton ammo trailer be used as it has stronger side walls to provide better protection against small arms fire. It also has larger tires for handling the heavier loads over rough terrain.

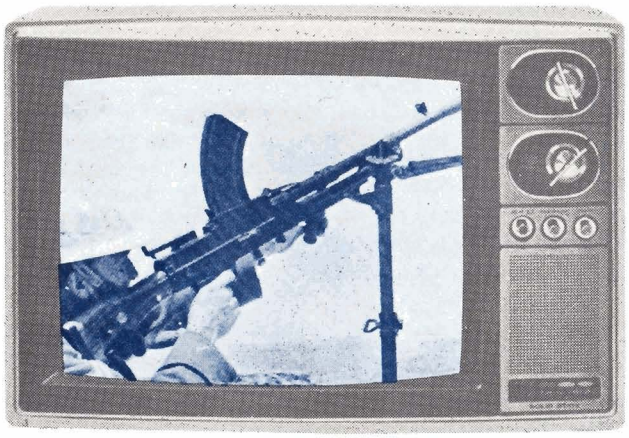
The swim capability of the Vulcan need not be hampered by a trailer because when a water obstacle is reached, the crew can simply top off the on-board ammunition supply with ammunition from the trailer, then drop the trailer and continue the mission. This capability would be enhanced if the Vulcan was modified with an automatically operated trailer hitch release which could be tripped from the interior of the carrier.

Another point to consider is that under present doctrine, ADA weapons accompany armor and mechanized infantry during such tactics as traveling overwatch and bounding overwatch, which make ammunition resupply difficult. In these situations, ammunition trailers for Vulcans would be ideal additions. They would cause no swim problem because the force Vulcan is supporting is not amphibious and would require bridges to cross any large rivers.

How about the problem of bringing effective M60 machinegun fire on attacking aircraft to obtain higher kill probabilities?

Instant Replay No. 4:

The Scene: Tobruk, 1941. The British are employing a slender pole-type mount for the antiaircraft Bren gun to help drive off German air attacks.



Instant Replay No. 5:

The Scene: Fort Bliss, 1976. A gunner fires the M60 machinegun from the M60 monomount during testing by the US Army Air Defense Board.

The M60 monomount is a single-leg antiaircraft mount for the M60 machinegun that, according to recent tests by the US Army Air Defense Board, substantially increases the accuracy of the weapon against aircraft. This improved accuracy is particularly important when we consider the lack of density of ADA weapons in a deployed division sector. The monomount can be used effectively on the ground, in vehicles, mobile assault, bridges, engineer bridge boats, etc. Since it is not anchored, it can be quickly moved from place to place. This characteristic is particularly valuable when a convoy is attacked by air because the gunner can take his M60 machinegun with him and seek cover from which to fire as the convoy disperses. Presently, all anti-aircraft mounts are fastened to the vehicles, and when the crew dismounts, the gun must be abandoned or a gunner must stay with the vehicle where he has no protection.

The M60 monomount is instantly adaptable to any terrain and is especially useful where surface irregularity does not lend itself to use of the bipod or tripod. The mount is completely rigid and is, therefore, far superior to the wobbly bamboo version used by the Japanese Army in World War II. Consisting of four telescoping sections, the M60 monomount weighs less than 2 pounds, which should make it particularly appealing to the infantry. At less than $40 each, it is certainly cost effective.

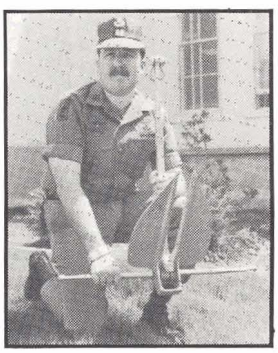
Finally, let's turn to the problem of our tactical vehicles getting stuck in desert sand.

Instant Replay No. 6:

The Scene: North Africa, 1942. The British Long-Range Desert Group (LRDG) adopted the Danforth sea anchor to serve as a fixed object for attachment of vehicle winch cables.

During the C22 FTX in which I recently participated, I noticed that when a vehicle got stuck in the sand, another vehicle had to be diverted to help extricate the one that was stuck, even when the first vehicle was equipped with a winch. Looking back to WW II again, the British LRDG encountered the same problem in Libya. For lack of trees or other stationary objects to which the winch cable could be secured, some lorries that became stuck had to be abandoned. It happened that the British Army was using naval officers as celestial navigators to guide the LRDG across the vast desert. It occurred to one of them that an anchor might substitute as a fixed object for the winch cable. Experiments proved successful using the British Danforth anchor. It solved the stuck vehicle problem for the British. A similar anchor is in the current US Army inventory (NSN 2040-00-377-8597) today (see photo below). It is used on bridge erection boats by Army engineers. Why, then, shouldn't we consider equipping our winch-bearing vehicles with this anchor during desert operations and make them self-reliant?

The problem-reducing devices in this article have already proved to be valuable, either in actual combat or in recent official testing. The devices have been forgotten or overlooked during the passing years — yet, it may be that these "instant replays" from yesterday could be our keys to success during the "live action" on tomorrow's battlefields.



Captain Farrell graduated from Infantry OCS in 1968 and later received his Bachelor of Arts degree from Hiram Scott College. He served 4 years in Vietnam and has commanded both Infantry and Air Defense units. Captain Farrell is currently assigned as an Instructor in the Combined Arms and Staff Branch of the Tactics Division, Tactics Department, US Army Air Defense School.

AIR DEFENSE: THE EXCALIBUR OF THE CORPS AND DIVISION COMMANDERS

COLONEL RUSSELL W. PARKER
LIEUTENANT COLONEL JOSEPH W. HOUSE

We have permitted ourselves to go so long without adequate air defense that we are headed for a potential battlefield disaster.

William C. Westmoreland
Chief of Staff, US Army

Since 1941, the United States has lost significantly more aircraft to ground-based weapons than in air-to-air combat, yet the development and deployment of ground-based air defense weapons have not been emphasized accordingly. Westy's statement was updated recently by General W. E. DePuy, TRADOC Commander, who said at the US Army War College: "Korea and Vietnam set air defense back a decade each — no commander in Vietnam would trade a helicopter company for an air defense battery; but the Arabs have demonstrated the effectiveness of the Soviet air defense system." To carry this idea further, the Army's Assistant Secretary for Research and Development, in describing how Soviet emphasis on air defense has been extended to allies and clients, stated recently: " . . . and today, to give a shocking example, Egypt alone has more SAM's along the Suez Canal than we possess in our total inventory."

The purpose of this article is to show that the Army must consider an immediate increase in the density of air defense weapons, both in the corps and division areas. In addition, as pointed out recently by a senior commander in Europe, the Army again must learn to rely on each soldier to do his part with individual and crew-served weapons, since there will never be sufficient air defense weaponry for the complete job. Force structures proposed here are aimed at avoiding battlefield disaster by creating a mix of air defense capabilities that maximizes defense against enemy air attack.

Now that our heads have been withdrawn forcibly from the sands of Egypt and Syria, we must revitalize our training and again teach our troops to "look up" for the air attack that is inevitable in any land conflict. Historically, this concept of using all available weapons for air defense is not new for the US Army — it only has been allowed to erode through lack of use. In World War II, for example, the Army's crew-served antiaircraft (AA) guns and machineguns were so lethal against low-flying aircraft that bombers rarely attacked at low altitude after their initial encounter with the "curtain of lead," and tactical fighters avoided flying on the deck whenever possible. A further example of the effectiveness of US antiaircraft artillery (AAA) in that war is found in the records of enemy aircraft losses in the Mediterranean area over a 2-year period. The number of Axis aircraft downed by AAA fires was *ten times* that achieved in air-to-air combat. Based on these and other historical examples, the case for restructuring our air defense forces begins to take form.

Today, especially as a result of the jarring successes of air defense in the 1973 Arab-Israeli War, there is growing concern that the quality and quantity of US air defense weapons are insufficient to counter the formidable and expanding air threat to our ground forces. In March 1974, Secretary of Defense Schlesinger recognized this fact in his report to Congress when he stated: "One conclusion upon which there is general agreement in the Defense Department is that major improvements in our theater army air defense are urgently needed." He continued by identifying two types of threat to NATO. First, a surprise attack by those forces presently deployed, which includes 58 divisions and at least 2,800 aircraft. Second, the possibility of an assault against NATO forces after mobilization and deployment by Warsaw Pact nations. In this case, estimates indicate the ability to deploy an additional 80 to 90 divisions within a relatively short time. It is safe to assume that a commensurate number of aircraft would also be available. Unless the US air defense capability can expand to successfully counter this threat, the ground forces are likely to be overwhelmed by enemy air. Thus, a need is evident for more air defense weapons that can limit enemy air strike effectiveness in the corps and division areas, as well as deter or cause attrition of deeper penetrations in the corps rear. Although the US Air Force will contribute to the air defense mission over the battlefield, its mission to attack enemy ground targets, and the intensity of air-to-air conflict forward of the FEBA, may mean that sufficient aircraft will not be available for both counterair operations and air defense of the ground forces.

THE GUN GAP

What are some current manifestations in the US Army that cause comments such as those quoted at the beginning of the article? The answer is basic — today's soldier gives little thought to air attack; worse yet, neither do many of his commanders. Active and passive measures against air attack are largely overlooked, and the passive capability is a highly neglected art. During the years following the Korean War, this indifference about enemy air attack was partially responsible for the removal of antiaircraft ring-mounts from the Army's tactical vehicles.

To add further to the demise of the AA gun and individual air defense capabilities, the strategic missile and bomber threat in the 1950's and 1960's prompted Army planners (air defense officers included) to give primary emphasis to CONUS air defense, leading to the development of Nike Hercules, a high-altitude, surface-to-air missile (SAM), and subsequently to the Safeguard ABM system. During this period, western military and civilian weapons and aircraft experts decided that the AA gun could no longer cope with high-performance jet aircraft. The supposedly obsolete gun system was replaced by the more exotic SAM. In many cases, even the name antiaircraft was dropped in favor of the term air defense, and AA gun systems virtually disappeared from western armies while they continued to be improved in the Eastern Bloc. The error of this thinking, coupled with the fact that US forces have not been subjected to significant air attack since the North African and Sicilian Campaigns, has given rise to a syndrome that might be called the "air superiority myth." This myth was perpetuated by the near lack of an enemy air threat in both the Korean and Vietnam conflicts. This negative philosophy worked its way into Army thinking and planning, even to include major exercises conducted at service schools. Although some revision is underway, many of these exercises invariably either attributed air superiority to US forces at the outset or assumed early achievement thereof, and subsequently ignored air defense.

This trend was not duplicated by the USSR and other Communist Bloc nations. It is evident from Korea, Vietnam, and the October 1973 Arab-Israeli conflict that Soviet tacticians place great reliance on AAA weapons — they obviously believe in the philosophy that, "the MIG's and SAM's get most of the publicity and glamour, but guns get most of the kills." The Soviets have continued to carry large quantities of these weapons in their force structure, and, in addition, have developed SAM's that are mobile, responsive, and reasonably reliable. These gun and missile systems exist in far greater numbers than their US equivalents (when there are any) and pose a threat to US aircraft that is indeed formidable. Part of the Soviet numerical advantage is due to the fact that they deploy large numbers of ground forces; however, they also provide greater air defense coverage per soldier. The USSR's attention to air defense is based on a realistic appraisal of the proliferation of air power throughout the world, as many nations continue to improve their air forces.

This is not to say that the United States should deploy more air defense weapons at corps and division simply because the Soviets do. Actually, US and Soviet Army air defense doctrines are similar. Both concentrate on air defense support of ground combat forces and destruction of hostile aircraft. The primary differences are the density of air defense weapons and greater Soviet emphasis on individual air defense. Soviet tank and motorized rifle regiments have organic AAA regiments, and, in addition to the guns, SAM's are employed throughout the combat zone. With this combination or family of weapons, air defense is tailored for combat. This concept exploded with astonishing effectiveness in the Mideast war and should have reawakened the armed forces of the world to the value of integrated, in-depth air defense coverage in the combat zone.

HOW ADEQUATE IS ADEQUATE?

Air defense adequacy considerations presented here are limited to organization and employment doctrine applicable to corps and division tactical operations. The air threat and targets or forces to be defended determine the requirements for air defense; however, those broad, classical air defense objectives listed below also are principal considerations:

Deterrence — In peacetime, to exhibit a posture with other deployed forces that will deter enemy forces from initiating hostilities.

Admission Price — If deterrence fails, to provide a sustainable level of capability in wartime that will extract a price in enemy aircraft that equals or exceeds the value of defended targets.

Attrition — To provide a long-term level of attrition of enemy forces during wartime that will preclude their effective use of friendly air space over the battlefield.

Past doctrine prescribed that a corps commander best employed his allocated air defense resources by placing them in an air defense group structure. The group was either attached to or placed in direct support of the corps by the field army. This method of organizing for combat relied heavily on centralized direction, and it favored retention of all nondivisional ADA elements under field army brigade command. Corps requirements were met by assignment of tactical missions to selected ADA groups. Several factors influenced this highly-centralized approach to

organizing ADA, the most prominent of which was the air superiority myth.

With the visualization of a nuclear standoff, the United States emphasized the capability for fighting a conventional war in the last decade. The Echelons Above Division (EDA) concept partially recognized an increased risk to forward-deployed combat elements fighting without air superiority. Doctrine now states that the corps will be tailored to meet mission requirements and will have either an ADA brigade or group headquarters with Hawk and Chaparral/Vulcan (C/V) battalions. These will be attached or assigned from theater ADA assets to support the corps and its divisions. Doctrine also states that the corps ADA brigade or group will normally provide a Hawk battalion in direct support (DS) of each committed division, with one or more Hawk units performing in a general support (GS) role. By using Hawk in a DS mission, the division is protected by responsive and complementary air defense weapons (Hawk and organic C/V).

Air defense doctrine advocates centralized control and decentralized execution.* Centralized direction insures that ADA weapons and air forces provide an integrated air defense for a theater of operations. Although the area AD commander executes centralized direction by issuing rules and procedures that are binding on all ADA units, decentralized execution is achieved by delegating authority to the corps commander for the control and employment of assigned or attached ADA forces. This delegated authority allows the corps and division ADA units to react instantaneously to hostile air attack. It permits fire units to be repositioned to support the corps offensive and defensive maneuvers, thus providing means commensurate with responsibility for mission accomplishment.

The tactical unit commander's battle is localized; therefore, it becomes a local battle for all elements of the combined arms team. This requires that ADA support be responsive to local battle requirements and closely tied to a particular combat unit (a brigade, division, or corps) and its operations.

A review of ADA resources available to the corps and division indicates obvious shortcomings in numbers and types of weapons and in overall coverage. Even if present concepts of mutual support and minimum siting requirements are violated, the latter persists. This brings to question the US Army's present scheme of organizing ADA assets in support of ground combat forces. The importance of decentralized execution, responsiveness, and closely integrated support of the tactical units needs to be emphasized and reflected in evaluating and restructuring air defense forces for the corps and divisions. Systems considered should have mobility equivalent to that of the forces supported, the ability to mass fires in the combat zones, and the necessary mutual support between fire units.

ORGANIZATION FOR COMBAT

Before developing organizational structures for corps and division air defense, applicable tactical missions must be defined. Current field artillery fire support tactical missions are easily adaptable to air defense units, therefore there are four possible tactical missions for ADA units: general support (GS), general support-reinforcing (GSR), reinforcing (REINF), and direct support (DS). With these missions, there is the normal establishment of liaison and communications, method of deployment, assignment of sectors of fires, and assignment of tactical missions to subordinate units. If one plans such missions for air defense units, one must keep in mind applicability, degree of tailoring of forces, and peculiar requirements. Although some ADA systems have a ground fire support capability, the magnitude of the air threat expected in future conflicts requires that these limited resources be reserved for their primary air defense role. While air defense units will be used occasionally in the ground support role, seldom, if ever, should this role be a primary tactical mission.

Support of the corps and division concept of operation is the overriding organizational principle. The force commander's mission, scheme of maneuver, and tactical situation require a clearly defined and responsive air defense structure providing the tactical commander with a closely coordinated defense while maintaining a capability to mass protective fires. Corps and division air defenses must be responsive to well-defined operating doctrine that is simplified and standardized as to conditions of readiness, air warning, rules of engagement, and hostile criteria. Authority to fire must be decentralized to the maximum extent possible, permitting exploitation of rapid reaction capabilities and rapid response to changes in the local battle situation. Corps and division commanders must be able to provide directly responsive air defense support to tactical units on the battlefield.

DIVISION COMBAT AIR DEFENSE (DIVCAD)

In concert with the above considerations, two air defense organizations are proposed — one organic to the division and one attached to the corps. The division organization is shown in Figure 1. This organization provides one Improved Hawk battalion, allowing the division commander to tailor Hawk resources so that one battery supports each maneuver brigade, with one battery in GS of the division. This structure furnishes

* *Although fire direction and control are critical elements, they will not be discussed in this article.*

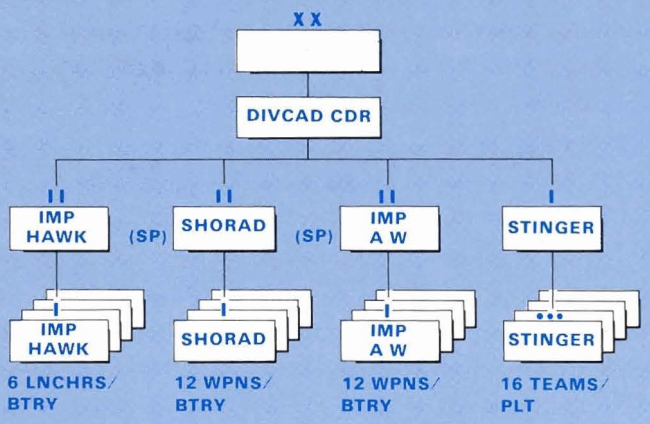


Figure 1

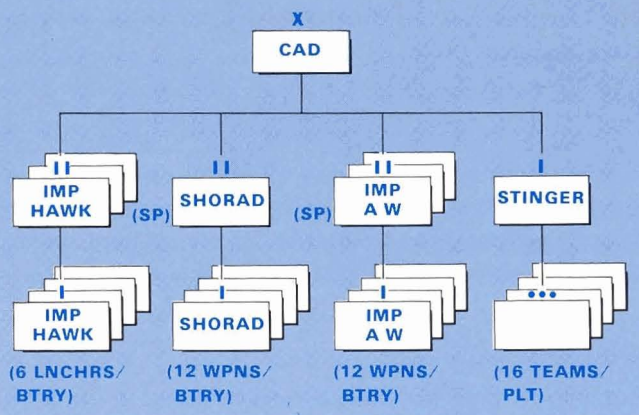


Figure 2

effective all-weather air defense against the medium-to-low altitude air threat. Additionally, it provides timely, dedicated surveillance of low-altitude approaches and a coordinated capability to counter enemy low-level, high-speed attacks.

All-weather, short-range air defense (SHORAD) missile system candidates, such as Crotale and Roland, were investigated as a possible replacement for Chaparral, and on 9 January 1975, the Secretary of Defense announced that the Roland system was selected for further testing. The proposed division combat air defense (DIVCAD) organization furnishes one all-weather SHORAD battalion which can be tailored for combat on the basis of one battery per maneuver brigade, with one battery in GS or GSR of the division. This provides defense against low-flying, hostile aircraft attacking unit positions and critical targets within the division area of operation. One battalion of the improved automatic weapon (IAW), a replacement for the Vulcan gun in today's inventory, is also included.

The proposed Stinger (replaces Redeye as the man-portable air defense weapon) organization provides a cohesive structure capable of more efficient administrative control of personnel. It allows for logical job and rank progression, while centralizing and standardizing training in Stinger operation and employment. Two-man Stinger teams would be employed in the same manner as field artillery forward observer teams, furnishing air defense for companies/batteries in their respective areas of responsibility. Centralized employment of Stinger results in necessary command and control and allows planning of overlapping, integrated fires. Those teams not deployed for protection of troop units would be available for deployment on a defense priority basis.

There would be 24 Hawk launchers, 48 SHORAD missile fire units, 48 IAW guns, and 64 Stinger teams — a formidable amount of coordinated and integrated protection for the division. These air defense assets could easily be positioned to support the local battle that is of such vital concern to the ground commander. This structure, organized and positioned to support the forward elements of the division in offensive and defensive operations, would put up a formidable "curtain of lead" for protection of the division against the low-altitude air threat.

CORPS COMBAT AIR DEFENSE BRIGADE

The theater commander, in allocating combat power to each corps commensurate with its assigned mission, usually attaches combat, combat support, and combat service support units, constituting a tailored force to accomplish the corps' mission. For the allocation of air defense assets, one must consider the changing air threat, the need for responsive protective fires, and the concept of mobility. To provide the most responsive ADA protection against the threat, habitual association is required through the corps' organization for combat. This practice of close association is accepted in the attachment of field artillery to the corps. Current air defense doctrine recognizes the benefit of such attachment for ADA resources, insuring adequate support of a particular operation. Advantages accruing are greater flexibility, responsiveness, concentration of fires, effective integration of fire support and ground combat operations, and the psychological benefit of close personal working relationships. The latter, especially between members of the combined arms team, enhances both training and conduct of operations.

Although the number of divisions attached to a corps can vary, a type corps CAD organization is shown in Figure 2, assuming two divisions. Corps is furnished three Improved Hawk battalions from the ADA brigade, one battalion for GS or GSR of each division, with the remaining battalion in GS of the corps protecting key targets such as reserves, nuclear delivery units, support aviation, heavy artillery, and special storage areas. One SHORAD battalion as well as three battalions of self-propelled IAW also are furnished. For

GS, GSR, or REINF missions, one battery of the SHORAD battalion could be associated with each division, as would two of the three IAW battalions. Remaining SHORAD batteries and IAW battalions could be employed not only to fill in low-altitude gaps not covered by Hawk but also to protect Hawk assets against suppression attack. To centralize administrative control and training, as at division level, a battery organization for Stinger is proposed. On the battlefield, however, the Stinger teams augment the SHORAD and IAW protecting corps targets, with the remaining teams assigned and under the operational control of specific supported maneuver units.

This type of combat air defense organization for the corps can be tailored easily to provide the necessary forces to support the ground combat forces in accomplishing their mission.

THE AIRSPACE HASSLE

Mention should be made of the airspace control* problem, although full coverage is not intended in this article.

The number of objects populating the airspace above the battlefield in any future war will be staggering. Competition for this critical volume among high-performance aircraft, helicopters, projectiles, rockets, missiles, and small arms fire will intensify, notwithstanding the possibility of additional air defense weapons being added to the corps and division. The effectiveness of air and ground-based fire support could ultimately be limited by efforts to control use of the airspace. Under existing doctrine and rules of engagement, it is virtually impossible to maintain continuous control of the airspace because of the complexity of the problem. It follows logically that to achieve maximum effectiveness from all airspace users and to minimize the possibility of airspace conflict, a simplified, mutually agreed upon solution to airspace control is required. Simplifying the rules of engagement and developing a willingness to accept certain risks can reduce this intricate problem to proportions that will allow resolution of the control equation.

*Some say coordination would be a better word, since no individual agency is ever going to be able to "control" the airspace.

Whether the Army or the Air Force is the responsible service for airspace control is not important. Although tests and exercises have been valuable in clarifying the problem, the separate services should discontinue the proliferation of airspace control manuals, position papers, studies, tests, and new acronyms. The service chiefs jointly should insure that service parochialism be replaced with teamwork and that a coordinated effort be undertaken to develop a solution to control of the airspace over the battle area. Once this portion of the problem is resolved, every effort should be made to eliminate or reduce the number of other factors in the airspace control equation to the point that it can be solved.

SUMMARY

It is obvious that US ground forces face a formidable air threat but lack sufficient assets for the desired air defense capability. The proposed air defense organizations for corps and division provide the tactical ground commander with dedicated antiair forces for accomplishing his mission. He could exercise centralized control over these resources through his air defense commander, who would be responsible for the planning and execution of air defense training, planning, and operations in accordance with the ground commander's guidance. These organizations provide an integrated air defense capability closely associated with the units being supported and insure both the force mix and capability to mass protective air defense fires at the decisive point in support of tactical operations. Their mobility allows flexibility in tailoring air defense to support the maneuvering elements at all levels of tactical organization. Finally, these proposed organizations place air defense in proper perspective, attuned to the need to be where the action is, fighting with and supporting combat ground forces as a vital member of the combined arms team. The Army must again learn to "look up" if it is to survive on tomorrow's battlefield.

Colonel Parker graduated from the US Military Academy in 1954 and holds a Masters Degree in Electrial Engineering from the Georgia Institute of Technology. He is also a graduate of the Command and General Staff College and the Army War College. He has extensive command and staff experience in ADA both in CONUS and overseas. At the time this article was written, he was Director of Curriculum Research at the Army War College.

Lieutenant Colonel House graduated from the US Military Academy in 1957 and has taken graduate work at the University of Colorado and Shippensburg State College as well as graduating from the Command and General Staff College and the Army War College. His air defense experience dates back to 1963 and includes both command and staff experience. At the time he co-authored this article he was serving as Strategic Research Analyst at the Army War College.

LIEUTENANT COLONEL JOSEPH P. FRANKOSKI

THE SILENT BO

They left Northern Honshu Island in Japan and followed the North Pacific route to the American continent. Nine thousand three hundred bombers. It had finally happened — the United States was under air attack.

As World War II was entering its final stages, the propaganda organs of the Japanese Empire broadcast the news that Nippon bombers had caused more than 10,000 casualties and started innumerable fires in the western and central United States. The bombers had taken 4 to 8 days to complete their flight. A bit slow? Maybe not. These bombers were free balloons.

On November 4, 1944, a rubberized silk balloon carrying radio equipment of Japanese manufacture was recovered about 66 miles off the shore of San Pedro, California. Several days later, another was recovered off Hawaii. Fragments of a Japanese 15-kilogram antipersonnel bomb were located near Thermopolis, Wyoming, on December 6th. Five days later a paper balloon was recovered near Kalispill, Montana. These discoveries were brought to the attention of the commanding general of the Western Defense Command.

Initially it was thought that they were weather or antiaircraft barrage balloons, but technical inspections indicated that they were actually bombers. The balloons were over 30 feet in diameter, and their payload consisted of antipersonnel and incendiary bombs. Built to fly at 20-30,000 feet, their flight was controlled by aneroid barometers which automatically released ballast at predetermined levels. A gas release valve operated by the barometer kept the balloons at a mean altitude of 30,000 feet.

Functioning was simple although not always effective. Thirty-two sandbags were used as ballast. All or most were dropped over the Pacific. Upon reaching the American mainland, the remaining sandbags and incendiaries were automatically released. Next the antipersonnel bombs were dropped; then the balloon would self-destruct. It was equipped with a magnesium flash ignitor charge designed to destroy the balloon by burning. A 2-pound demolition block was carried for destruction of the automatic ballast dropping mechanism.

Usually the payload consisted of four incendiary (thermite) bombs, each weighing 4.46 kilograms, and an antipersonnel bomb. This bomb, weighing slightly over 33 pounds, had a bursting radius of 50 yards.

American intelligence credited the balloons with more than bombing capability. It was estimated that they could also be used to transport saboteurs to the United States, collect meteorological data, conduct chemical and bacteriological warfare, divert American military forces from other functions, and be a medium for terrorizing the civilian population.

A meeting was held on January 17, 1945, to evaluate the situation and determine solutions to reduce the effectiveness of balloon attack. It was decided that the Fourth Air Force would furnish advance information on weather conditions which would be favorable for balloon attack. This same organization would also photograph balloons in flight and shoot them down over isolated areas. It was further decided that experts in bomb disposal and bacteriological warfare would be present at recoveries and incidents.

Other meetings were held in which the possibilities of bacteriological warfare carried out by means of the balloons were discussed. Interested state and federal officials were informed of the situation.

To prevent alarm in the population, the commanding generals of various Continental U.S. commands personally briefed news agency personnel in the United States, Mexico, and Canada on the intelligence aspects of the bombing balloon campaign.

Only two known articles were published about the "bombers." The Japanese used these stories for propaganda purposes.

Planning continued, and on August 15, 1945, a plan, "Defense Against Japanese Free Balloons," (short title, BD-1) was completed. Signed by Rear Admiral G. B. Davis, US Navy, Deputy Commander of the Western Sea Frontier; and Major General H. C. Pratt, Commanding General of the Western Defense Command, this plan contained a joint mission. Simply stated it was to "defend the area of the Western United States from attack by means of Japanese free balloons."

BD-1 envisioned both active and passive defense. The purpose of active defense was to detect and destroy the

balloons. They were to be located by radio signal detection combined with reports from ships, planes, and meteorological studies as well as by radar and visual sightings. Destruction was to be accomplished by aircraft and antiaircraft artillery.

Controlling damage was the purpose of passive defense. Bomb reconnaissance and bomb disposal personnel were to locate and dispose of the dropped ordnance. Biological and chemical warfare personnel were to combat those types of warfare. Also included in passive defense were military assistance to civilian fire fighters and dissemination of instructions to civilian agencies.

Associated with the planning against the bombing balloons were Firefly Project and Sunset Project. Firefly Project was a plan to provide special military assistance in fighting forest and grass fires. A number of L-5 and C-47 aircraft, plus 2,700 troops (of whom 200 were paratroopers), were to be stationed in probably hazardous fire areas for use in firefighting missions.

Fourth Air Force conducted Sunset Project which was to determine the effectiveness of a new type of

MBERS

ammunition called headlight tracer. Headlight tracer would be fired from aircraft machineguns to down the balloons. The results of Sunset Project were inconclusive due to cessation of the balloon attacks.

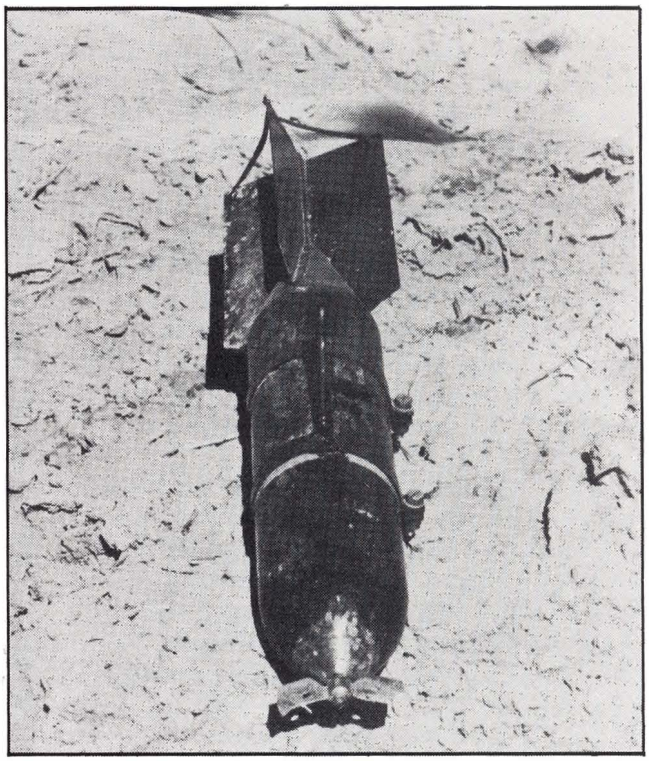
The Japanese discontinued balloon bombing in the spring of 1945. It is possible that the general lack of news and publicity about this air threat may have helped to influence that decision.

Actual effects of the attacks were insignificant. A woman and five children on a Sunday school picnic were killed by an antipersonnel bomb which they found and tried to take apart. A few small fires were started.

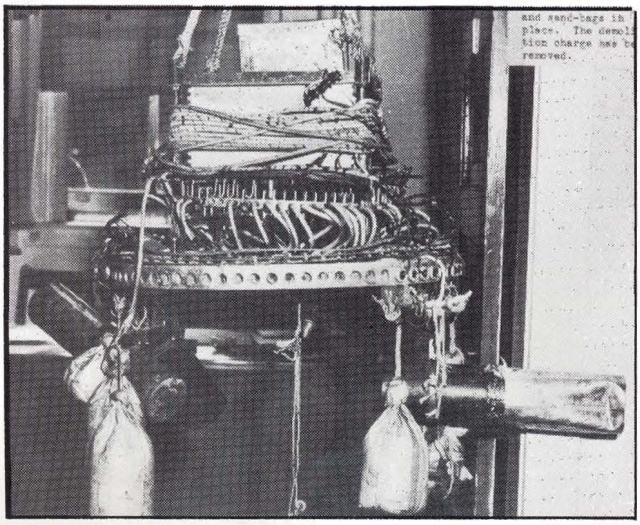
Balloons were recovered as far inland as Michigan, northern Mexico, and Canada, giving an indication of their range.

Besides being unconventional bombers, construction of the balloons was also unusual. According to a Japanese officer, the bag part of many of the balloons which were being launched toward America consisted of hundreds of small pieces of paper pasted together.

Balloons were launched from this site on Northern Honshu Island and sent on their way to the United States by way of the circle route. Only 400 of the 20,000 bomb-laden balloons reached their destination.



One 15-kilogram (33-pound) antipersonnel bomb was carried by each Japanese balloon. Four thermite incendiary bombs completed the payload.



Side view of the Japanese balloon ballast-dropping device with three thermite incendiary bombs and ballast sandbags in place.

These pieces were made by school children all over Japan, gathered up village by village, and shipped to a central assembly place for reshipment to the factory where the balloons were finally completed.

Why were balloons used as bombers? American intelligence thought the Japanese wanted to retaliate against the American mainland for the bombing of Japan. By using balloons, ships and planes would not be risked in these retaliatory strikes.

Lieutenant Colonel Frankoski is an Infantry officer assigned as Chief of the Command Information Branch, TRADOC Information Office. He will soon complete work for a masters degree in history at Old Dominion University. His service includes assignments in Germany and Vietnam.

AIR-LAND FORCES APPLICATION

A new directorship called Air-Land Forces Application (ALFA) has been established by the US Army Training and Doctrine Command (TRADOC) and the US Air Force Tactical Air Command (TAC). Located at Langley Air Force Base, Virginia, ALFA's fundamental function will be to effect cooperation between the Army and Air Force to eliminate duplicate projects and increase preparedness for the first battle of the next war. This cooperation means the Air Force will be less intense about its rules on packing equipment for transport in cargo aircraft. It means an Air Force pilot will be flying his aircraft over enemy positions because Army artillery is helping suppress enemy air defense systems.

The philosophy behind ALFA is that during a war, the land battle and air battle cannot be considered separately. They must be considered as one battle, and Army and Air Force plans should be conceived along these lines. The air above the battlefield must be shared by both Army and Air Force helicopters and aircraft. The solution is that Army aircraft may maneuver freely up to a certain altitude. The Air Force will control the higher altitudes. This is a practical solution and a necessary basic agreement.

Other Considerations

The Army determined that the chances of aircraft being hit by artillery were almost nonexistent. As a result, the controls that had been in effect on firing into areas where aircraft were operating have been dropped.

It is expected that ALFA will audit TRADOC/TAC activities and say who is planning what, when they intend to do it, and how they intend to do it.

ALFA is working on a number of projects designed to overcome enemy tactics. Rather than being a theoretical "think tank," ALFA is concerned with tangible problems — those of winning the first battle of the next war.

Conventional warfare problems, those resulting from lessons learned in the 1973 Arab-Israeli war, are being studied closely. Military experts foresee some of the same problems in the next war.

ALFA is studying Soviet antitank missiles, for example. They were responsible for heavy Israeli tank losses until it was discovered that a smoke screen could confuse the enemy gunner. Smoke, however, presents its own problems. Friendly smoke screens can also hamper US antitank weapons and air-to-ground missiles. ALFA is taking a new look at the defensive tactic.

Unattended ground sensors, which are designed to detect enemy movement, are under study also. Both the Army and Air Force have their own versions of the ground sensors and neither is compatible with the other. Ground force commanders want as much information as possible and a common system is an ALFA goal.

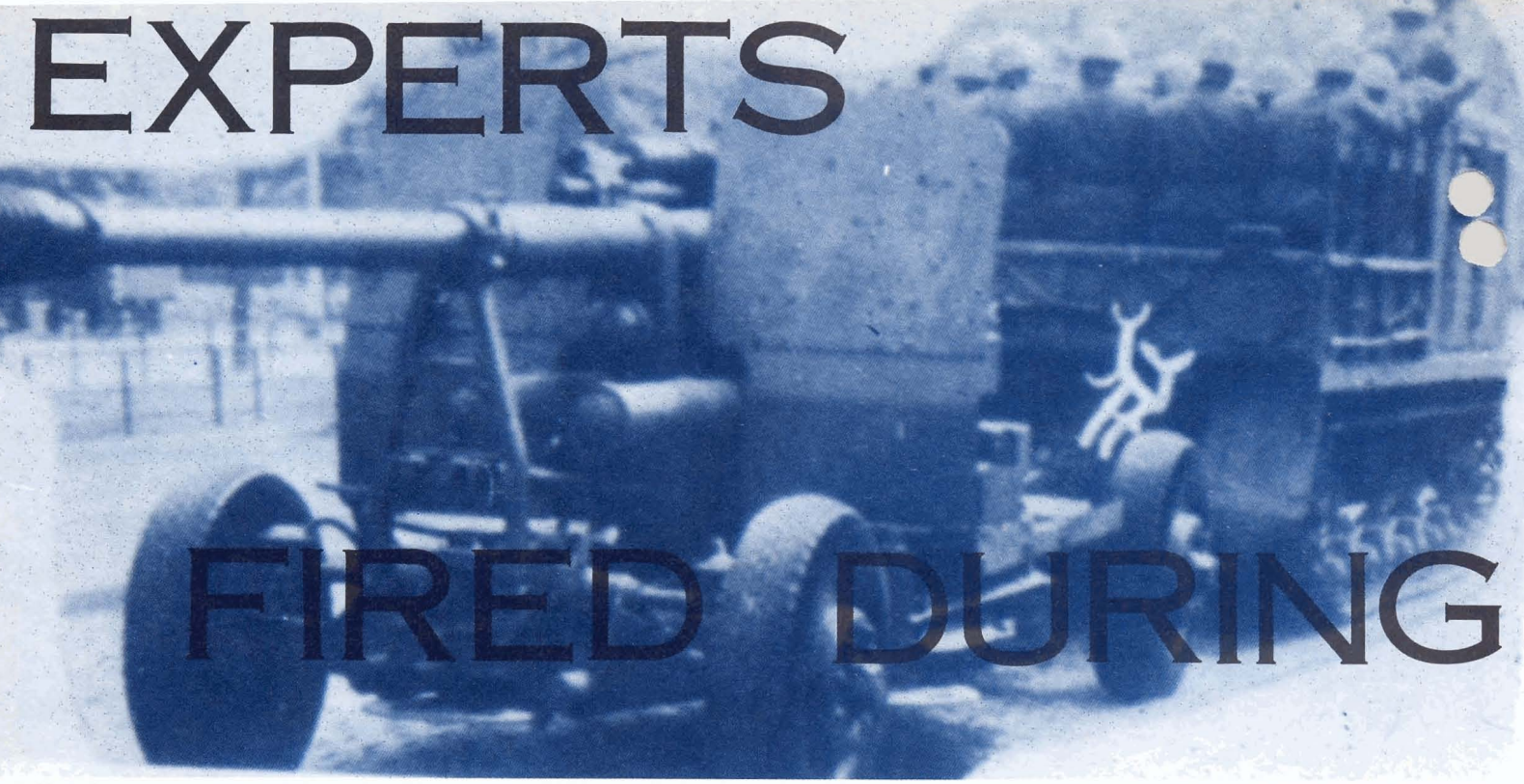
Israeli aircraft had to overcome the Soviet-built air defense umbrella employed by Egypt during the 1973 fighting. ALFA is looking at tactics that will enable US aircraft to penetrate the air defense system safely and attack the enemy's rear. A potential enemy plan of attack may call for one echelon to attack, with a second force a few miles behind ready to carry on the fight. Current US doctrine assumes that our ground forces will be outnumbered, and disabling the second echelon would even the odds considerably. This action is not without sacrifice though. Our ground forces would have to fight without all the close air support they would normally have, since some of it would be used to attack the second echelon. Some of the artillery support would have to go the same way, too, to suppress enemy air defenses.

ALFA is also examining the role of forward air controllers and forward observers — whether they should be Army or Air Force — and where they should be positioned (in the air or on the ground).

Since ALFA is a joint organization, it works for the commanders of both TRADOC and TAC. Being in the position of having two bosses has its own peculiar advantages and disadvantages. However, the two Commanding Generals, DePuy and Dixon, share the same view — that interservice rivalries must not interfere with getting the fighting teams, the Army and the Air Force, together.

The joint working groups and ad hoc task forces of ALFA will be concerned with concepts and procedures only, not doctrine. Also, they will work through TRADOC's Deputy Chief of Staff for Combat Developments and TAC's Deputy Chief of Staff for Plans; thus, the working groups will be able to do things without being tied down by normal command procedures. They can do the job of coordinating TRADOC and TAC efforts towards the same goal — preparing for the first battle of the next war.

EXPERTS FIRED DURING



There can no longer be any doubt that helicopters, equipped with diverse types of onboard weapons and capable of destroying ground targets, have become an indispensable part of modern combat. On the basis of materials found in the foreign press, it would appear that the search is continuing for ways and means of improving the flight-technical characteristics of helicopters as well as their armament and the methods employed by them for carrying out strikes against various targets. The successes achieved in this sphere have fostered the erroneous conclusion that tanks are gradually forfeiting the role which they played on the battlefields. Those who support this point of view usually refer to the events of recent times. Some of them have devoted a great amount of thought to the question as to which would emerge triumphant from single-handed combat — a helicopter or a tank.

If the tanks are left without antiaircraft support, and if a reliable antiaircraft defense is not organized for them, then the answer is quite clear. If the tank personnel and the motorized riflemen are protected against air strikes, and if they are trained well to conduct and participate in modern combat, then the potential of helicopters and aviation will be sharply limited and they will be unable to prevent ground *podrazdeleniye** from carrying out their assigned tasks. This was borne out during a recent and conventional exercise involving field firing conducted in the Transcaucasus Military District.

Let us hear from one who participated in the exercise discuss exactly what aided the podrazdeleniye in winning the battle against the helicopters. Let us hear from the Commander of a division of 100-mm antiaircraft guns, Lieutenant Colonel B. Boloshov.

In mastering the more promising methods for firing against helicopters using 100-mm guns, we had to determine first of all the advantages and shortcomings of each. It was clear that if for some reason it was impossible to use a radio instrument complex, then point blank firing would have to be conducted against both low-flying and diving aircraft. However, a hovering helicopter loses its principal features of an airborne target: speed and direction of flight. Consequently, there is no requirement for firing at helicopters in the same manner as against an aircraft flying at a short range, since curtains of fire are not necessary. Nor are the rules for firing against ground targets appropriate here; first, because the range to a helicopter is as a rule greater than 1,000 meters and, secondly, the time that it is stopped in the air is limited to 2-3 tenths of a second. This deprives the antiaircraft gunners, during the course of ranging, of the opportunity of searching for an established bracket in two graduations of the fuze.

After weighing all of these circumstances, we decided to conduct fire in the following manner:

We determined the axes which were favorable to the helicopters in the firing sector and found there,

commencing with the range of 6,000 meters, highly visible local objects and we determined the accurate distance to them. Thereafter, using the table for firing a 100-mm antiaircraft gun against ground targets, we computed the fuze settings and we recorded them on the card for opening point blank fire, while naturally taking into account the vertical sighting angle.

When a target appeared over one of the selected local objects (reference points), the battery commander issued the command to open fire and he did not indicate either the fuze settings or the vertical sighting angle. Rather, he mentioned only the number of the appropriate reference point. The gun commanders located the point on the card and computed the data.

It is our opinion that this method is particularly useful when it is necessary to distribute the fire of guns among several helicopters, as was the case during the exercise. The preparations for firing can be accelerated if the sergeants are furnished with tables in which the numbers of the reference points and the fuze settings are shown in the proper order.

The gun layers, having memorized the locations of the reference points in the sector, aim their guns at the target, the third member of the crew sets the vertical sighting angle on the vertical aim-off drum, and the ammunition handlers take care of the fuze. Naturally, no lateral lead is introduced.

The firing was carried out by salvo fire, since all of the crews were well trained and well prepared to carry out combat operations in the same manner. If this were not the case, the firing would have been by rapid fire. The first salvo was for ranging purposes. It enabled us to make a judgment regarding the accuracy of the initial data and the work being performed by the personnel. We did not have one incident wherein the center of the dispersion of the bursts did not coincide with the target. I have in mind both the vertical and lateral directions. In the case of range, the average point of burst at times takes place behind the target. This is bad when one considers the matter of fragmentation patterns. In such cases and when changing the fuze settings, we strive to ensure that the majority of bursts are underflights and that the target is in the fragmentation pattern cone.

In conclusion, I would like to add a few words concerning corrections for the pictorial plane. When the possibility exists of observing the bursts for each gun, the sergeants determine their deviations from the target and introduce corrections for the lateral and vertical directions, using the observation results for each burst. The corrections are assigned in multiples of 0.02.

THE EXERCISE

COLONEL M. KIRYUKHIN

This article is reprinted from Voennyi Vestnik *(USSR Military Herald), a magazine published by the USSR Ministry of Defense in Moscow.*

*Podrazdeleniye is the Russian term for "subdivision." It is used to refer to a subordinate unit of a 'chast' (a unit of regimental or smaller size). It is any unit which cannot be fully identified numerically except by reference to the larger unit of which it is an integral part: battalions, companies, and platoons of a rifle regiment; the battalions and batteries of an artillery regiment; the companies of an engineer or signal battalion.

SOVIET 100-mm AA GUN (N-49)

Rate of Fire	15-20 Rounds per minute
Maximum Range	21 Kilometers
Maximum Altitude	13 Kilometers
Muzzle Velocity	900 Meters per second
Shell Weight	15.9 Kilograms
Traverse	360°
Elevation	-5° to +82°
Radar	FIRE CAN

In the Still

Night operations is a much-discussed subject that most of us don't really do as much about as we should. Let's consider for a moment what is really involved in night operations from the purely human standpoint. Due to historical precedent and other more pertinent psychological and physiological reasons, humans in general are less active during darkness than in daylight. Most of us habitually sleep at night (especially as we grow older), so the first stumbling block in the path of night operations is one of attitude on the part of each of us. At night we would rather sleep than exert ourselves, but is that the complete answer? In times past, man constructed shelters to protect himself from the elements and from known as well as imagined threats. His primary concern in regard to these threats focused on the hours of darkness and on the unknown. We finally got around to it — man was afraid of the unknown and consequently of the dark because of what dangers it might hide. Like it or not, we all still have those inbred fears and suspicions to some degree.

The physiological considerations are more readily identifiable and also are more readily admitted. Humans can't see well at night. A great deal of work has been and is being done to perfect night vision devices of various types, but the fact remains that at this point we simply cannot do everything as well and as fast at night (even with these devices) as we can in daytime. What is the problem? First, our ability to see color is seriously degraded, if not lost entirely. This impediment takes away our ability to identify contrast. Our ability to see things dimishes as our perceived surroundings approach a single color (black in the case of complete darkness). This loss of contrast causes us to be unable to see movement when it occurs, or to think we see it when it doesn't occur. Thinking back, the ghosts we saw out of the corner of our eye at night during childhood were really nothing more than a barely discernable contrast, and apparent movement was caused by the movement of the eye. So we don't see things we want to see and think we see things that aren't there. Depth perception goes to pot, so we can't judge distance with any accuracy. That's the reason we find ourselves stepping over obstacles when they are still some distance in front of us and not stepping over them when they are immediately in front of us. Anything else in the physiological line? Yes indeed. Our internal clock (the one that tells us to eat at noon even though we may not be hungry and to go to bed at the usual time even if we aren't sleepy) requires time for adjustment before we can operate efficiently at night. If you've had an oversea move by aircraft, the problem was probably brought to your attention forcefully within the first couple of days after arrival when you found yourself waking up bright eyed and bushy tailed at midnight or some other equally undesirable time. It was probably mid-morning or noon where you came from. Remember how it took a few groggy days to overcome the malady? Last but not least is the real bear — FATIGUE! This is probably the most ignored and most important factor of all since it accentuates all the other problems. When we do conduct night operations we persist in continuing routine daytime operations at the same time. Why? Sometimes the tactical situation dictates that we do so. So be it. But more often it is because we are expected to do so by those who are not involved in night operations. As a consequence, we find ourselves in an endurance contest to see who can stay awake the longest. We need not discuss what happens to efficiency as the contest drags on.

To this point we have admitted that some of us are a little afraid of the unknown (dark), that we can't see well at night, that we require time to adjust to working at night and sleeping during the day, and that we can't play all day and howl all night for any extended period of time without a serious degradation in operating efficiency. What's to be done about it?

That which is unknown loses its uniqueness when it becomes known. How then can we best deal with our fear of the unknown (dark)? The first step is to thoroughly acquaint ourselves with what changes occur in the environment after darkness falls. There is usually a drop in temperature and sometimes a change in wind speed and direction. Many animals and insects are active only at night, therefore, different sounds are heard and different creatures are encountered. There are many other more subtle changes but the preceding are the most apparent. None of the changes causes any major apparent changes in human behaviour, but may cause actual as well as perceived changes in one's environment. The next step, then, becomes that of learning to cope with the actual and *perceived* environmental changes. The best teacher is practical experience obtained by conducting night exercises in the field. This will create a familiarity with the night environment while providing valuable experience in moving about as well as accomplishing tasks in darkness.

What about our inability to see at night? Training is most important here. Some of us have better night vision than others due to heredity, general state of health, and other factors, but all of us can improve our

of the Night

LIEUTENANT COLONEL BILLY A. LYLES

night operating efficiency through training. Use the senses of touch, hearing, and smell to the maximum extent possible. Start with simple tasks such as cross-country movement. The successful completion of these tasks builds self-confidence and provides the basic experience required for advanced training in night operations. A logical progression from simple to more complex tasks will prove to be the most efficient training method. Three very important points: One's night vision does improve, within limits, in proportion to the amount of time one is exposed to near dark conditions. This, of course, is not true under conditions of absolute darkness. Do not be deluded into thinking that improvement in vision is the result of improvement in training. So far as vision goes, you will be back where you started at next nightfall. Secondly, *recognize* and *accept* that you and everyone else has a diminished capability at night and *plan* accordingly. Many otherwise well-planned and executed actions have failed miserably because forces were trapped in poorly concealed and vulnerable positions at sunrise. Finally, use those night vision devices available to you but do not try to use them as a substitute for proper training.

Adjustment to nighttime hours and fatigue go hand in hand. If time and the tactical situation permit, the unit which is to conduct night operations should go on a night work schedule at the earliest practicable date. The longer everyone has to become acclimated the better. Three to five days (nights) is probably the most beneficial lead time. During this time, personnel should be picked for key staff positions to serve as day shift representation in working with adjacent and higher echelon units. These personnel could then effect the coordination needed and provide continuity. Remember that whatever effort we attempt may have to be sustained for some time so everyone should be well rested at the start of the operation.

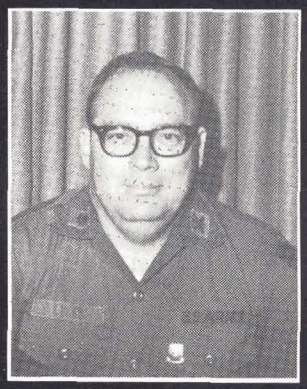
The preceding has been an attempt to explore very briefly the problem of night operations from the human side and to generate active interest in the area. The facets covered are not presented as all-inclusive and no doubt many readers have their own thoughts. If so, they should be written down and sent to Air Defense Magazine for scrutiny just as these were.

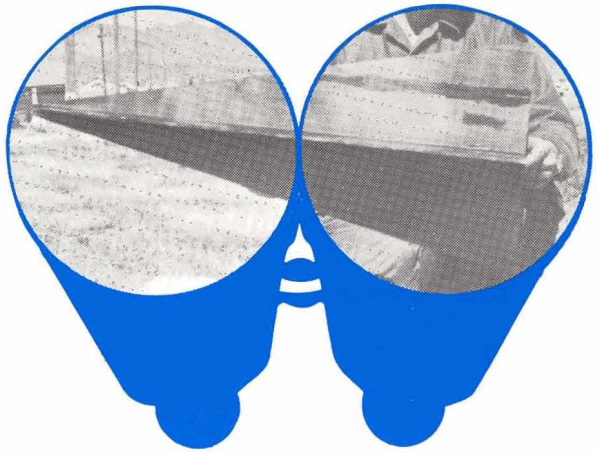
As a partial disclaimer to my lead paragraph, I feel obliged to point out that work has in fact been done in the area of night operations involving both equipment and human factors by Headquarters, TRADOC Combined Arms Test Activity, Fort Hood, Texas.

Two parting shots:

- Give yourself and your people some training in night operations. It will pay off someday (or night).
- Don't forget that in the case of night operations there's always a light at the end of the tunnel, so your plans must be made accordingly.

Lieutenant Colonel Lyles holds a Bachelors Degree in Mechanical Engineering from Auburn University. His air defense experience includes service in Nike Hercules and Hawk units. A member of the R&D Specialty Program, he is serving as the US Army Air Defense School Representative at the Training and Doctrine Command Combined Arms Test Activity (TCATA), located at Fort Hood, Texas.





VIEW from the FIELD

NEW TRAINING TARGET

CAPTAIN CLIFFORD P. BLACK, JR.

A recognized need for a realistic yet economical training target for Vulcan and for small arms for air defense (SAFAD) firings has resulted in the fabrication and testing of a balsa wood sleeve target for use with the Comet II radio-controlled model airplane. At present, the model airplane is being used more and more to provide a realistic aerial target for Vulcan and SAFAD firings. Although the radio-controlled model airplane does serve as a good target, it is not economical. The projected annual cost of the 4th Infantry Division's model airplane program, based on past cost accounting, is $30,000. The model airplane presently used as a target, the Comet II, costs approximately $400. Even with recoverability of reusable parts, the program is expensive, not only in parts but also in the man-hours required for building the planes (6 hours to build each plane). Furthermore, as the gunners become more and more proficient, the cost of the program increases proportionately.

For the foregoing reasons, the Division Airspace Management Element (DAME), 4th Bn, 61st ADA, has developed a balsa wood sleeve target to be used with the model airplane program. The sleeve target is aerodynamically designed and consists of four triangular pieces of balsa wood fastened together at the center with epoxy glue. The resultant shape provides a realistic profile that is the same size as the model airplane (3 feet long and 15 inches wide). Aluminum foil is attached to each fin to provide a good radar reflector for the Vulcans. The sleeve target is towed 125 feet behind the Comet II radio-controlled model airplane by a nylon cord. This distance provides sufficient protection for the model airplane. Since the balsa sleeve is realistic in profile, the gunners are less likely to fire at the model airplane rather than the sleeve target. In all tests conducted thus far, no problem with the gunners firing at the model airplane has been encountered.

Figure 1. The Comet radio-controlled model airplane and the balsa wood target sleeve.

The model airplane used has been modified by substituting a larger engine, the Fox 78, to overcome the drag caused by the sleeve. The speed of the sleeve target is about equal to the speed of the model airplane previously used as the target. Also, the Comet II used as a tow plane is equipped with an additional servo for the quick release mechanism. The release mechanism is remotely controlled, allowing the pilot to drop the sleeve target before landing the airplane.

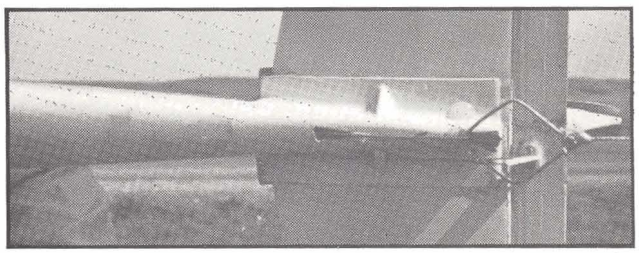


Figure 2. Quick-release mechanism attached to the Comet II model airplane.

Figure 3. Target pickup action.

The method of sleeve pickup is very simple and has proved to be extremely reliable. Two men, separated by approximately 40 feet, hold the nylon twine loop above their heads. The pilot then flies the Comet II with a weighted hook dangling under it between the men and picks up the sleeve target (see Fig. 4). The hook is attached to the quick release mechanism which allows the pilot to drop the sleeve prior to landing. A fishing swivel is placed in the nylon cord in front of the sleeve target to prevent line twisting. Also, a small line with a weight attached to one of the balsa wood fins increases the stability of the sleeve target in flight.

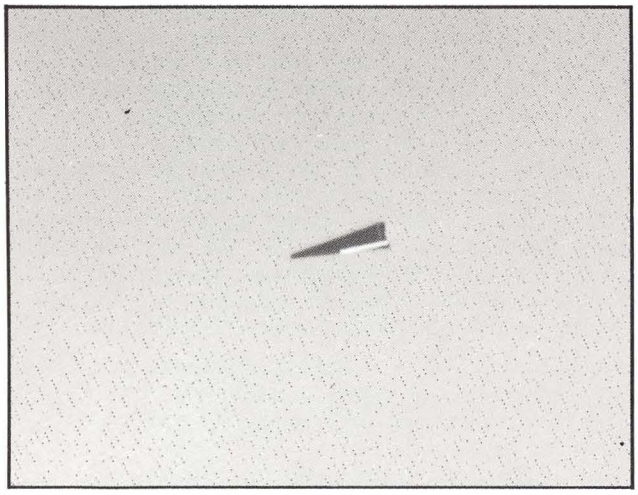


Figure 5. The balsa sleeve target in flight.

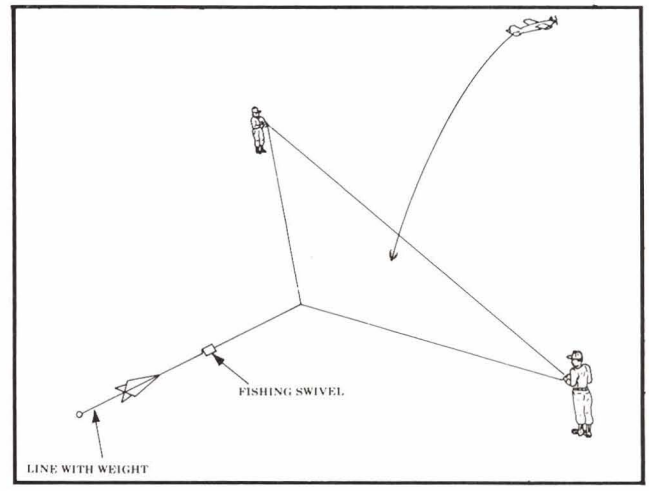
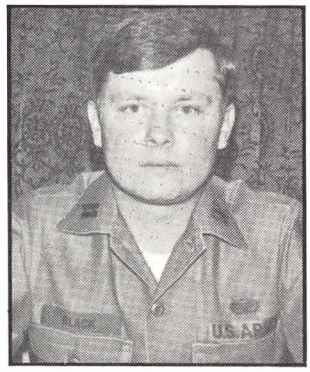


Figure 4. This drawing shows the method of sleeve pickup.

When the pilot has completed the prescribed number of passes or has used the flight time available before refueling, he brings the model airplane and sleeve in low over the landing area. Then, using the quick release mechanism, the pilot drops the sleeve target. The lightweight balsa sleeve merely floats down to the ground; and then the line, hook mechanism, and sleeve are retrieved to be used again.

The balsa sleeve target has been flown successfully for a Vulcan and SAFAD firing. The results of the field tests are very encouraging. The balsa sleeve target towed behind the Comet II provided a realistic target (shaped like a Delta-wing fighter). No reduction in target speed was noticed because of the added power of the larger Fox 78 engine. The balsa sleeve target was flown through all types of aircraft maneuvers in winds gusting to 30 knots. Approximately 10 minutes flight time is available before refueling. Gunner training time is increased because targets can take many more hits than the model airplane and continue to fly. Gunner performance can easily be evaluated by simply observing the tracers and counting the holes in the sleeve. In addition, the balsa sleeve is economical — $10 versus $400 for the model airplane.

Testing conducted by the 4th Bn (C/V) (SP), 61st ADA, Fort Carson, Colorado, indicates that the balsa sleeve target is highly effective, responsive, realistic, and economical. It is expected that the target will save the 4th Infantry Division $20,000 annually.



Captain Black wrote this article while he was the Airspace Management Officer for 4th Bn, 61st ADA. He has recently taken command of D Btry, 4th Bn, 61st ADA. Since graduating from the US Military Academy, he has received a Masters Degree in Mechanical Engineering from the Georgia Institute of Technology and completed the ADA Officers Basic Course. He is experienced as a Chaparral unit commander and as an airspace management officer.

WHAT DO YOU DO NOW,

LIEUTENANT?

SITUATION

You are the platoon leader of 1st Platoon, Battery A (Vulcan), 441st ADA, 52d Mechanized Infantry Division. Your platoon is in direct support of a tank/mechanized infantry company team. The team is tank heavy, consisting of a tank company HQ, two tank platoons, and one mechanized infantry platoon. The team will spearhead the brigade's attack, with the mission of seizing and securing a key bridge in the brigade zone.

The team commander gives the following intelligence briefing: We have enemy tank and motorized rifle elements operating east of Phase Line Blue. The exact locations and strengths are unknown. The high-performance air threat is present but is considered minimal; however, we can expect enemy helicopter activity east of Phase Line Blue. The air defense warning is RED and weapons control status is WEAPONS TIGHT.

Since enemy contact is expected, the team commander decides to maneuver his elements using the bounding overwatch technique. The battlefield consists of gently rolling hills with no prominent terrain features. Fields of fire may be restricted by woods and trees. Based on his analysis of the terrain and the enemy situation, the team commander elects to bound initially within the lead platoon until the entire team reaches Hill "A" where he can observe the terrain to the east. He will then issue his orders using visual signals or radio as appropriate.

As the Vulcan platoon leader, you should now be reviewing the employment guidelines to determine how you will position your Vulcans to support a bounding overwatch maneuver.

EMPLOYMENT GUIDELINES

- Maintain coverage forward of the maneuver elements.
- Weight the flanks of the long axis whenever the team goes on line.
- Insure mutual support between Vulcans.
- Provide for Vulcans' survivability.

In most situations these guidelines can be met by employing the Vulcan platoon with the overwatching element. This means that the Vulcan platoon may be crisscrossing the battlefield from one overwatch position to another. When positioning the Vulcans with overwatching tanks, Vulcans should be located toward the flanks of the tanks' long axis, since this formation offers the most lucrative enemy air attack opportunity. Except for rare circumstances, the Vulcans should remain with and in the same configuration (e.g., hull defilade, turret defilade) as the overwatching platoon. This deployment provides for survivability and mutual support, except when the length of bounds will not permit the Vulcans to maintain the bulk of their coverage forward of the bounding element. In that case, the Vulcan platoon should be split into two sections, with one section accompanying the bounding element.

The team commander issues the following orders: To the 1st tank platoon: Move to Hill "A," 500 meters northeast of checkpoint 1. Overwatch the town and the hills to the east.

To the 2d tank platoon and the infantry platoon: Follow me. Be prepared to bound by platoon once the 1st tank platoon is in position on Hill "A."

The 1st tank platoon secures Hill "A" without making contact. The team commander moves to a vantage point and determines that the terrain beyond Hill "A" favors bounding by platoons.

To 2d tank platoon: Move south around Hill "A" and secure Hill "B."

To the infantry platoon: Be prepared to join the 2d tank platoon on my orders.

The 2d tank platoon secures Hill "B" and the team commander issues his order:

To 2d tank platoon: Overwatch the 1st tank platoon.

To 1st tank platoon: Move north around Hill "B" and secure Hill "C" which is 450 meters away.

To infantry platoon: Join 2d tank platoon on Hill "B" and be prepared to clear the town to the south.

As the 1st tank platoon moves around Hill "B" and starts toward Hill "C," it detects three Sagger antitank missiles being fired from the woods to the north. The overwatching tank platoon lays a base of suppressive fire on the wood line. The bounding tank platoon places suppressive fire on the Sagger positions. The artillery FO calls for smoke and artillery fires on the wood line and the town to the south. The 1st tank platoon secures Hill "C" without being hit by the Sagger missiles.

The objective is now in sight, and the team commander issues his orders for the final assault: The 1st tank platoon will stay on Hill "C," providing overwatch for the other two platoons. The Vulcan platoon will join the 1st tank platoon and provide air defense coverage over the objective.

When the 2d tank platoon and the mechanized infantry platoon come abreast of Hill "C," the mechanized infantry platoon starts to sweep the wood line to the south.

Everything progresses as planned when suddenly enemy armor appears from the wood lines to the south and the north of the objective. The tank platoons begin engaging the enemy armor forces. Suddenly Sagger antitank positions located in the wood lines to the front and south open fire. The team commander requests the artillery FO and the Vulcan platoon leader to place suppressive fires on the Sagger antitank positions.

PROBLEM

What are your actions? Do you place your Vulcans in a ground support role?

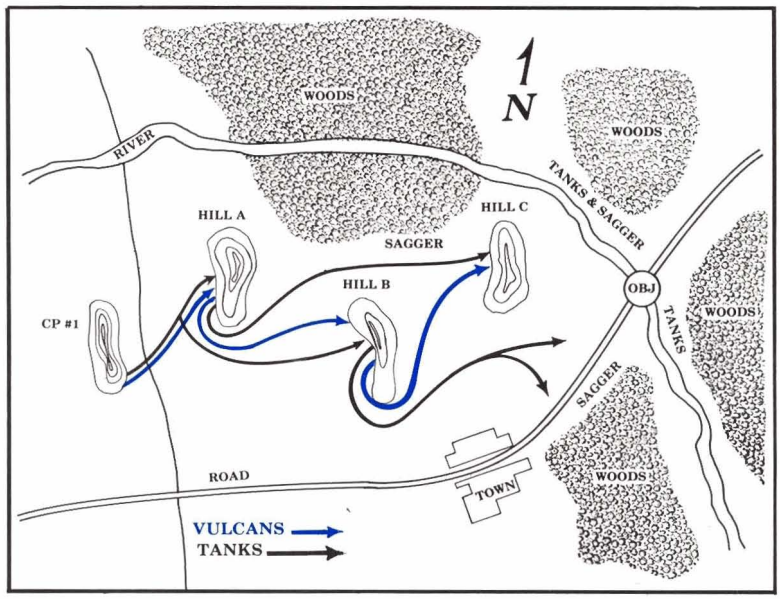
SOLUTION

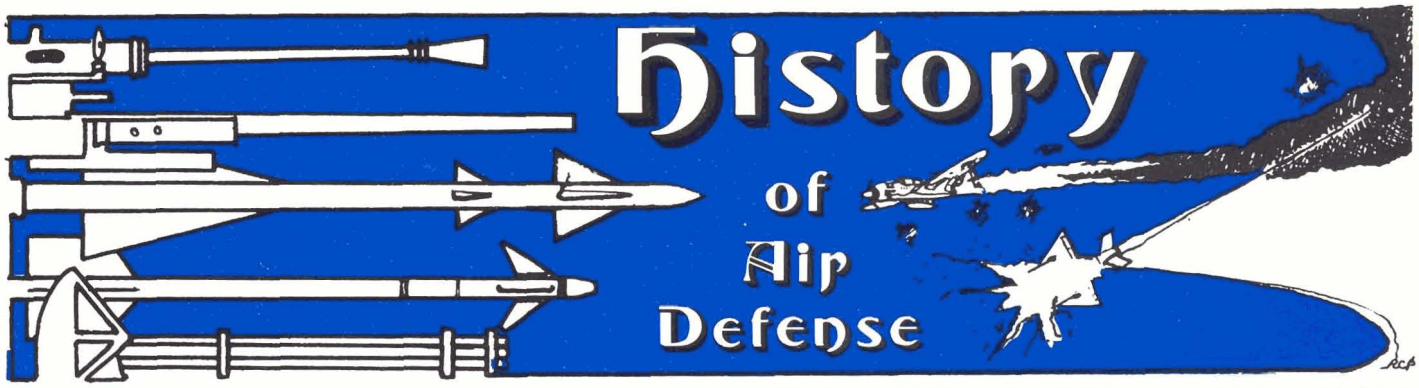
Your platoon's mission is to provide air defense coverage for the maneuver force. However, there has been no enemy air activity so far and the immediate threat is the Sagger antitank positions. The tanks are engaged with the enemy armor force and you have the only remaining weapons capable of placing immediate suppressive fire on the antitank guided missile (ATGM) positions. The considerations for employing Vulcan in the ground role are:

- What the greatest immediate threat is to the maneuver force and/or
- The availability of 20-mm ammunition.

Based on these considerations, you should immediately order at least a pair of Vulcans to place suppressive fire on the Sagger positions. Have each Vulcan fire a 30-round burst at a Sagger position. Observe the effects of the burst and, if needed, place more fire on that position. Once the position has been silenced, immediately acquire another Sagger position and place suppressive fire on it. Insure that your Vulcans are aware of the location of all friendly units.

If possible, you should keep a pair of Vulcans in the air defense role. However, if it is not possible, maintain at least one air guard per Vulcan in case the enemy has requested close air support. You should establish a rate of fire with the Vulcans that will insure that all Vulcan gunners exercise judicious expenditure of ammunition to retain their air defense capability. Remember, your primary mission is to provide air defense for the maneuver force.





During World War II, we often heard comments about secret weapons being developed by Germany. Of several that could qualify, certainly the rocket must have been one. The V-1 and V-2 rockets were the only "secret weapons" completed in time to have any influence on operations before the war ended. Here is an account of V-1 employment and Allied countermeasures.

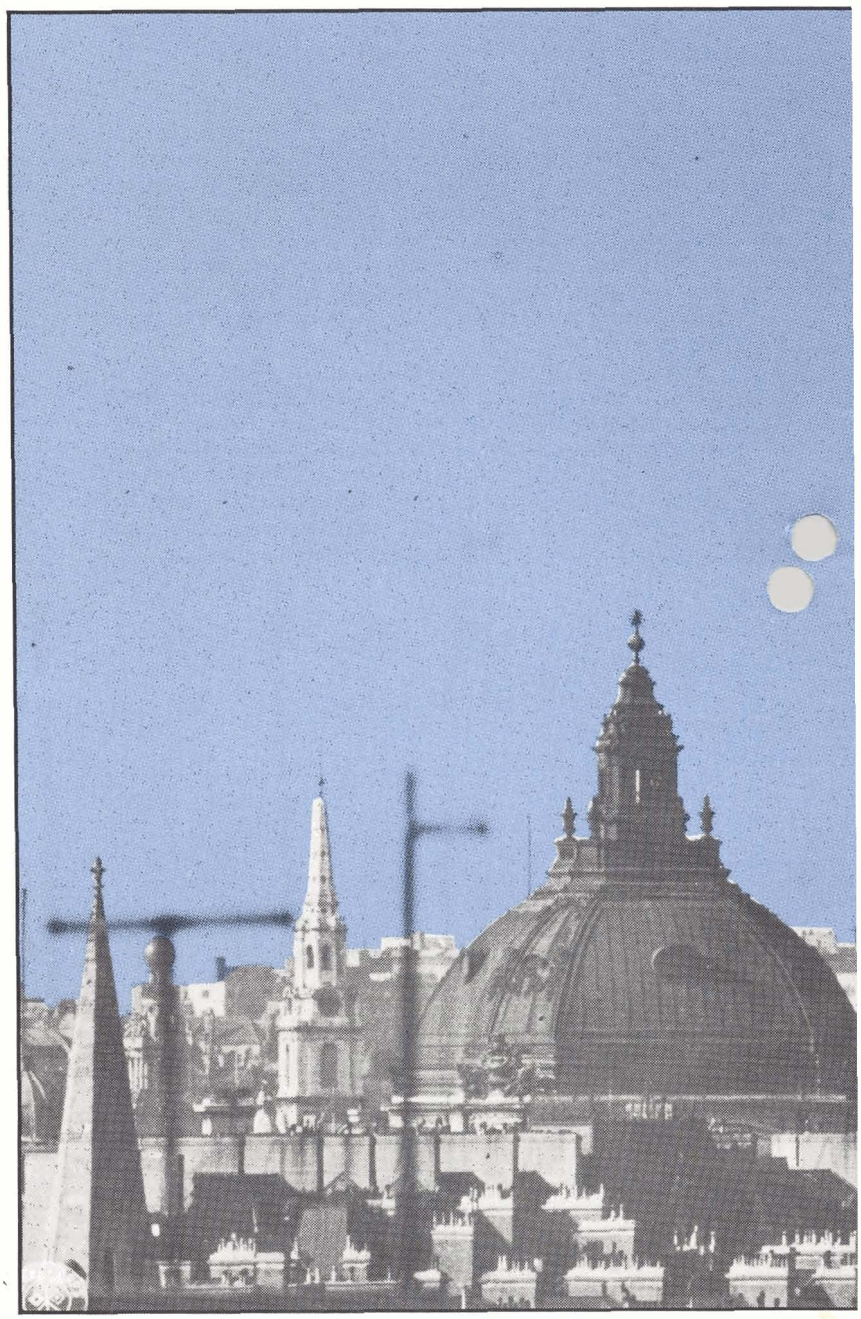
V-1 ATTACKS AGAINST THE UNITED KINGDOM

The V-1 missile attacks against the United Kingdom began during the night of 13 June 1944 and ended 29 March 1945.

The German V-1 was a relatively small, automatically controlled, jet-propelled monoplane carrying nearly a ton of high explosives. The air range was 250 miles; speed, 300-400 mph; and altitude, preset for 600 to 10,000 feet. Control in flight was by magnetic compass and gyros, and maneuverability was a preset straight course with one turn up to 45° possible if preset.

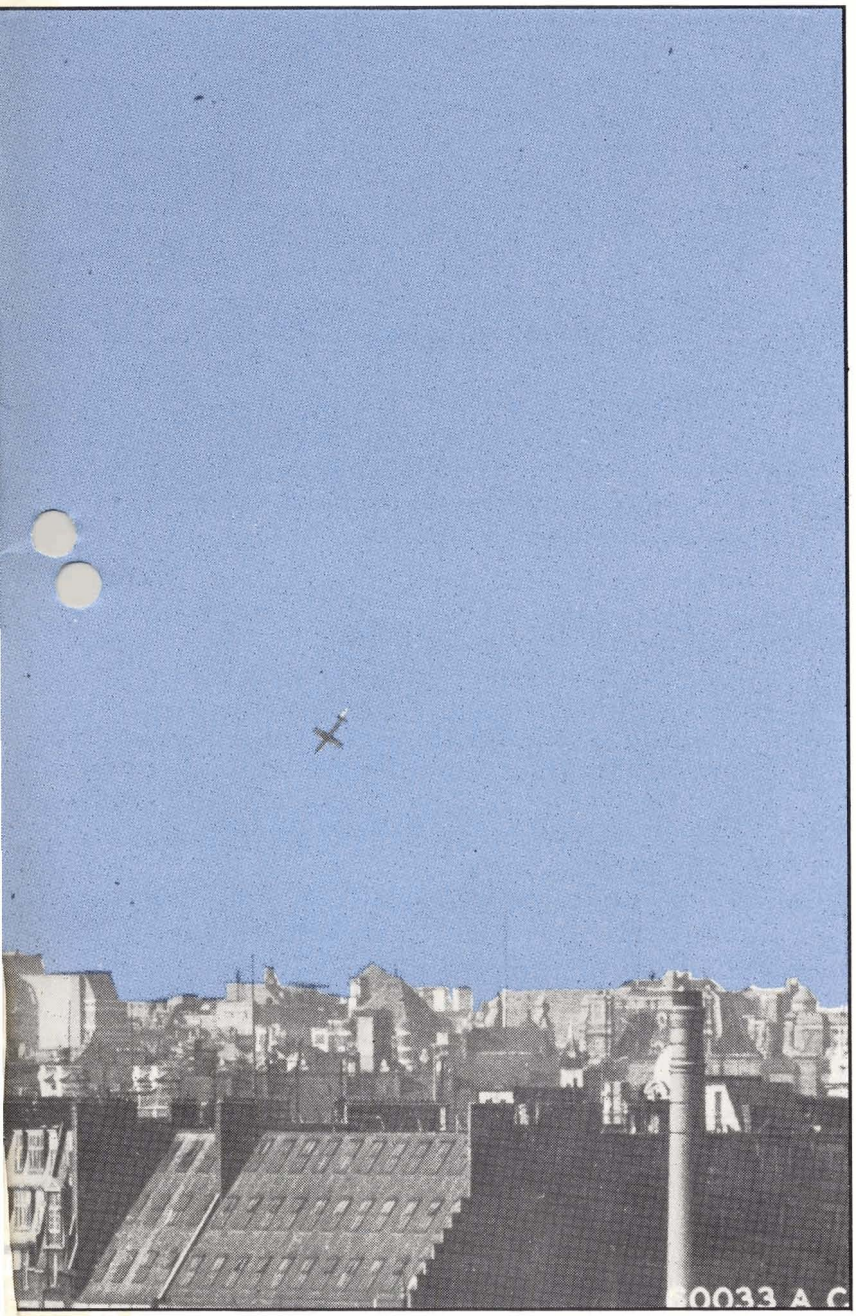
V-1 activity against England occurred in three different periods. The first and most important was 13 June 1944 to 5 September 1944. On 6 June, V-1 operations were ordered to begin on 12 June 1944. On the night of 12 June, Allied bombing knocked out the V-1 regimental telephone communications network, but by 2300, 63 of the 72 launching positions reported ready for fire. Firing began at midnight, but only 9 V-1's left their launchers, and none of them reached England. A second salvo, totaling 10 V-1's was launched at about 0330, of which 4 reached England — 1 struck London. Four of the ten crashed near their launching sites.

The majority of launchings in these 3 months was made from sites in northern France. Large numbers of bombs crossed the southeast coast of England between Dungeness and Dover, and a few crossed the Solent area. The main target was London, except on three nights when the Portsmouth and Southampton areas received the brunt of the attacks. The distance between the launching ramps and London was 100 to 150 miles.



A German V-1 rocket dives into a r[illegible]ti

The V-1, in some respects, was an ideal target for AA guns because these flying bombs normally flew a straight course and maintanied an amost constant altitude and speed. Nevertheless, the V-1 had a smaller vulnerable area than piloted aircraft. It was a difficult target to destroy, since it could be stopped in its course only by a hit on the detonator of the warhead, the destruction of a large part of the wing, a hit on a vital part of the engine, or on the robot pilot. Many of the bombs were not stopped, although their courses were changed when parts of the machine were damaged or the engine hit.



[illegible] of London near Trafalgar Square.

The average altitude of the flying bomb was about 2,500 feet. The lowest recorded altitude was 500 to 600 feet and the highest, 8,000 to 10,000 feet, but few bombs came over England at the latter altitudes. The average recorded V-1 speed was about 400 mph. The highest was 480 mph and the lowest 230 mph.

From 15 June 1944, the date when the V-1 attacks began in force, the English early warning system was excellent. British gun operations rooms on the coast gave advance notice of incoming V-1's, and antiaircraft operations rooms were operated at eight different airfields for the AA guns. From these centers, warnings were telephoned to each fire unit.

By 16 June, a belt of AA guns was established just south of London. There were 192 British 3.7-inch and American 90-mm guns in this belt, which was about 6 miles in depth and located midway between London and the southeast coast. About the same number of 40-mm and 20-mm AA automatic weapons was placed along this belt, and 480 barrage balloons were located in the area between the gun belt and London. By the end of June 1944, the number of AA guns in this belt had been increased to 376 and automatic weapons to 576. In addition, there were 192 40-mm and 368 20-mm weapons on the south coast of England and 1,700 barrage balloons near London.

The gun belt had been placed inland to reduce enemy jamming of radar equipment (which was not encountered) and to prevent interference with coastal defenses operating against piloted aircraft.

In the weeks while the AA guns were in the inland gun belt, they were restricted from firing whenever RAF planes were over the area, and the success of the guns was not great. The AA guns in this period also were prevented from scoring many hits due to inadequate equipment and the lack of a sufficient number of guns. As a consequence, the RAF destroyed about three bombs to one by antiaircraft.

It was decided that the V-1's should be destroyed over water instead of over land to lessen the danger to military and civilian personnel and property by falling V-1's. Mutual interference between AA guns and fighters would be eliminated. By 14 July, the decision had been made to move the AA guns to the coast and establish a 5,000-yard-deep gun belt from Beachy Head to Dover which could fire 10,000 yards out to sea. The move itself was no mean feat. The 376 mobile AA guns and 526 automatic weapons had to be moved to the coast, together with 32 static AA guns and some 40 additional static guns diverted to the gun belt. Well over 23,000 troops made the move, 3,000 miles of interbattery cables had to be relaid, tactical communications had to be rerouted, and 30,000 tons of ammunition and an equal amount of normal supplies

had to be moved by some 9,000 service troops, using 8,000 trucks that travelled some 2,700,000 miles to do the job. The move was completed in 5 days.

The new belt would give the fighters plenty of room for interception farther out over the Channel and behind the gun belt. Over the gun belt, fighters were restricted to flying above 8,000 feet, and the guns were free to fire up to 6,000 feet. By 17 July, the defenses against the V-1's were arranged as follows: a fighter zone was established over the English Channel, an antiaircraft gun belt along the coast from St. Margaret's Bay to Auckmere Hover, a fighter zone behind the coast, and a barrage balloon belt nearer London. The RAF planes also patrolled the French coast, spotting V-1's, and over the gun belt above the firing height of the guns. After the gun belt was moved to the coast and equipment improved, American SCR-584 radars and M9 directors were received. The crews then became more skilled and the percentage of kills by antiaircraft guns rose while that by the RAF declined. With the introduction of VT fuzes, the antiaircraft effectiveness increased to the extent that, within the first week of the redeployment, the guns shot down 17 percent of the targets entering their area, and, by the last week in August, their effectiveness reached 74 percent shot down.

By 7 August, there were 592 AA guns, 892 40-mm and 405 20-mm automatic weapons, and 254 rocket projectors operating against flying bombs in the coastal belt. In the Thames Estuary, there were 220 AA guns and 174 40-mm and 404 20-mm automatic weapons. The establishment of the coastal gun belt helped to increase the success of the AA guns against the flying bomb.

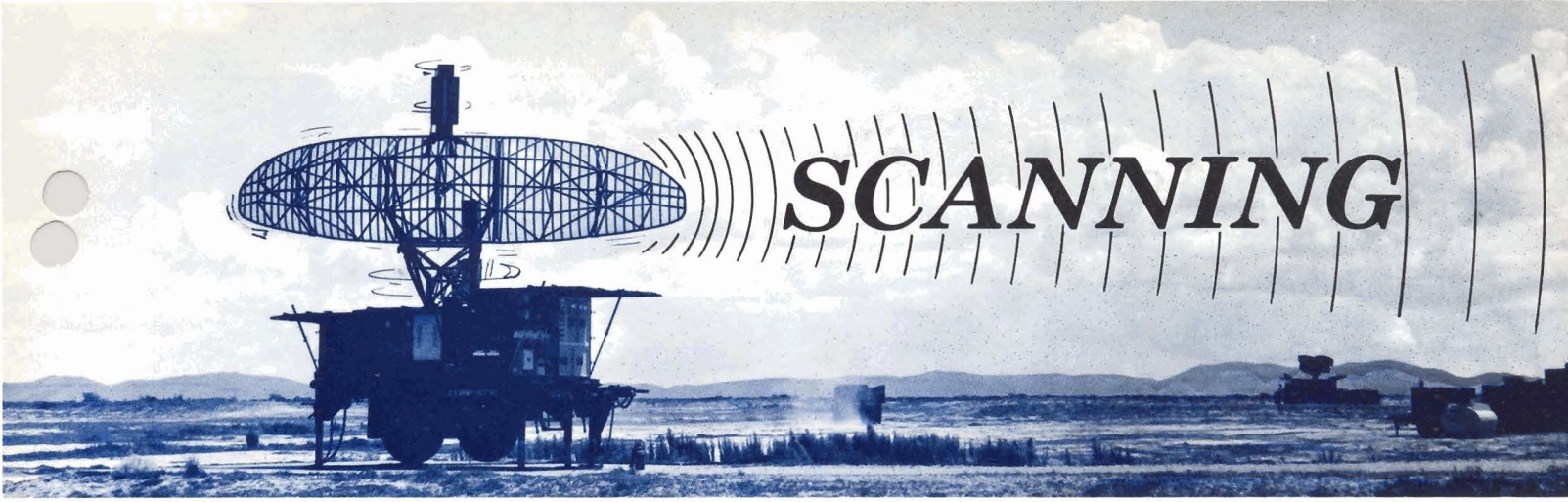
The second period of the attack against England was the time during which the bombs were air-launched; it lasted from the first week in September 1944 until the middle of January 1945. Germany had been experimenting with the launching of flying bombs from aircraft, and, when the Pas de Calais area was overrun by the Allies, this method of launching was put into effect. Allied intelligence had revealed German intentions in air launching and, to combat phase two, a further integrated concentration of antiaircraft weapons was established and additional countermeasures were taken. When the enemy shifted his attack from the south to the east coast, the gun belt was moved to an area stretching from Clacton to Great Yarmouth. The kill rate continued to improve, and, by the end of November, 80 percent of the V-1's were being destroyed with an average expenditure of 156 rounds per kill.

During phase two, there were 1,012 incidents recorded in air launchings against England. Of the 495 possible antiaircraft targets, the gunners shot down 320; an additional 84 V-1's were destroyed by other means. The air-launched missiles were unsuccessful from the German point of view, for little major damage to London resulted. Due to the further advances of the Allies on the Continent, the German attack became less intense, and, about mid-January 1945, air launchings against England were abandoned.

The third period of the attack against England was the second period of ground-launched flying bombs, but this phase did not begin until 3 March 1945. This time, the bombs were launched from Holland. The missiles were launched from ranges of about 190 to 200 miles. Of the 158 V-1's launched during this period, 92 were destroyed (87 by antiaircraft fire). By the end of March 1945, the strength of the Germans was failing, and the Allied armies had crossed the Rhine and were working their way steadily across German lines of supply in Holland.

It was concluded that:

- The American SCR-584 radar and M9 director and remote-controlled, automatic-loading guns made it possible for antiaircraft crews to increase the number of V-1's (within range) destroyed from 9 to 71 percent.
- The 40-mm and 20-mm guns were relatively ineffective against V-1's because of their inefficient fire control systems.
- At first, guncrews had great difficulty in recognizing the V-1 targets on radar scopes. After some experience, they learned to recognize the images mainly because this type target, unless damaged, traveled in a straight line.
- Barrage fire, used extensively at first, was found to be less successful than aimed fire.
- A normal antiaircraft defense in depth, including AA guns and alternate aircraft zones along the expected path of the V-1's, was found to be the best defensive system.
- Firing over the sea instead of over land was preferable because it permitted more extensive use of the VT fuze, provided improved radar reception, and reduced the restrictions placed on AA guns when aircraft were attacking V-1 targets in the same area.



BEST IN THE WEST — 1/55th ASP

A spectacular night firing on 27 April 1976 of two Chaparral missiles climaxed the highly successful annual service practice (ASP) of 1st Bn (C/V), 55th ADA, 5th Inf Div (Mech), commanded by LTC John W. Moore. During the period 19 to 22 April 1976, A and B Batteries (Vulcan) fired the highest scores recorded thus far for this fiscal year at Fort Bliss and possibly the highest ever recorded world wide. B Battery (Towed Vulcan) was high battery with a composite score of 97.6 percent. Leading the way was the 4th Squad, 3d Platoon (led by SSG Vander L. Blue) with an overall score of 99.8 percent. A Battery (Self-Propelled Vulcan) was a very close second with a composite score of 97.3 percent. During the ASP, each crew fired at aerial, ground, and indirect fire targets. Brigadier General Robert J. Lunn, then Assistant Commandant of the US Army Air Defense School, received briefings by 1/55 personnel and observed the record firing performance of both batteries. Also in attendance were officers from the 24th Infantry Division headed by COL Ben A. Walter, DIVARTY Commander, who was very impressed with the air defense skills of the officers and soldiers of the 1/55.

C Battery (Chaparral) was evaluated the following week. The battery successfully destroyed all four of its ASP targets and recorded an overall score of 97.1 percent. In conjunction with the Chaparral ASP, C Battery fired 12 missiles for the US Army Missile Command (MICOM). These experimental MICOM missiles were the final test rounds of a product improvement program leading to the issuance of improved missiles for all Chaparral units in the field. Worthy of special mention is the fact that all 16 Chaparral missiles (4 for ASP and 12 for MICOM) were fired in one 8-hour period.

Visiting the Chaparral ASP was Brigadier General Thomas W. Bowen, Assistant Division Commander, 5th Infantry Division (Mech). Approximately 650 visitors, including dependents of battalion personnel, were present to observe the Chaparral firing. 1/55 was activated at Fort Bliss, Texas on 22 December 1975 as the Chaparral/Vulcan battalion providing low-altitude air defense for the 5th Inf Div (Mech).

CHAPARRAL/FAAR PROJECT OFFICE

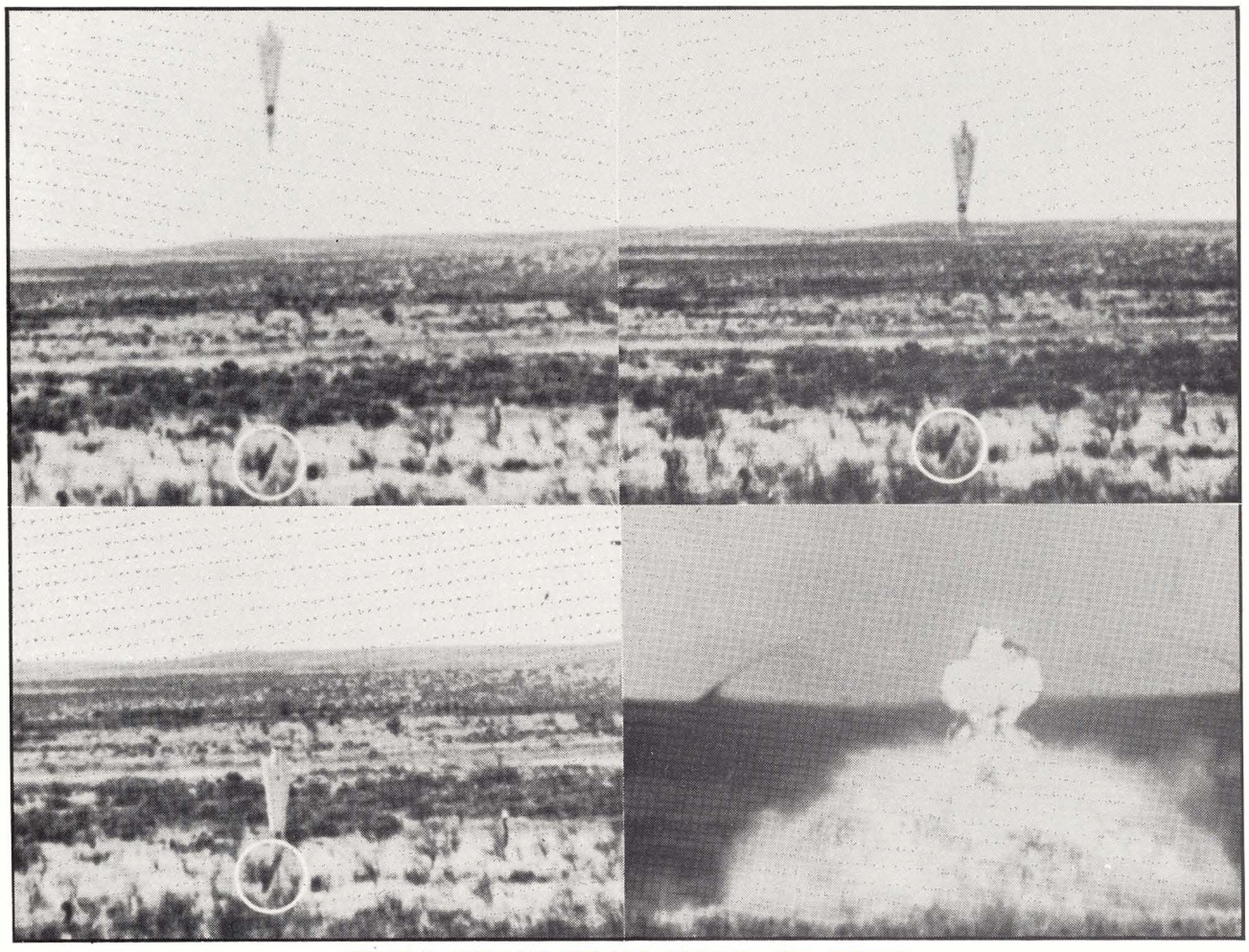
Chaparral/FAAR is officially a project office at the Army Missile Command. The Secretary of the Army recently approved the project charter which elevates Chaparral/FAAR from a provisional MICOM management office to a full-scale project office. Chaparral is a heat-seeking missile that defends against low-flying enemy aircraft, and forward area alerting radar (FAAR) is its early warning eyes.

Colonel Howard C. Whittaker is Project Manager for Chaparral/FAAR which has 55 people, 48 civilians and 7 military, and George Woodward is his civilian deputy. The office is located in Building 7172.

Chaparral was deployed in 1969 but a major missile improvement program, plans for new production, and interest by foreign countries wanting to buy the air defense system caused MICOM to pull Chaparral/FAAR out of the Special Items Management Office more than a year ago and appeal to higher headquarters for project office authorization.

"We're greatly increasing Chaparral's intercept and kill capabilities," said Whittaker, "giving it a 360 degree intercept capability, reducing battlefield signature, and providing more positive identification on incoming targets." Older Chaparral missiles had no head-on intercept capability.

Earlier this year MICOM awarded approximately $21.2 million to cover initial production of the Improved Chaparral missile, which features a new guidance section, an improved fuze, and a new warhead. Other improvements planned for Chaparral are a smokeless motor, an identification, friend-or-foe (IFF) system, and an antiglint canopy for the Chaparral self-propelled vehicle.



HERC SURFACE-TO-SURFACE TEST

The needle-nose Army missile with swept-back fins roared off the launch pad and soared skyward like a bird of prey, just as it has done for some 17 years. But instead of swooping down on a drone or fast-moving jet, the plane killer pitched over gradually and a minute later plunged back to earth to land within a few meters of a surveyed stake some 20 miles from where the missile was launched. The missile was a Nike Hercules, the place was McGregor Range, New Mexico, and the occasion was the continuation of a recent firing program to evaluate Nike Hercules in a surface-to-surface role.

In all, the Army has fired 18 missiles at surveyed targets during the current testing series. The flights ranged in distance from less than 20 to over 100 miles and outstanding results have been achieved.

The purpose of the tests is to validate improvements in Nike Hercules and evaluate new firing tables and procedures that have been developed to increase system accuracy and reaction time.

MICOM has been conducting the tests in cooperation with the US Army Air Defense Center and the Air Defense School. The first phase of the testing took place June through August 1975, and the second commenced in February this year. Soldiers from the 4th Battalion, 62d Air Defense Artillery assembled all missiles and conducted the firings.

In the current phase of testing, a new target data unit (TDU) was installed in the battery control van at A Battery, 4/62. This 14 by 11 by 3-inch box is used in lieu of the target tracking radar (TTR) to provide target data input to the system for surface-to-surface firings. The TDU has proved to be a highly reliable replacement for the TTR.

All missiles are launched from the permanent site of the 4/62 at McGregor Range. As shown in the foregoing photo sequence, the Nike Hercules system has the potential for extreme accuracy. This effectiveness is being demonstrated at ranges of 30, 50, 125, and 180 km.

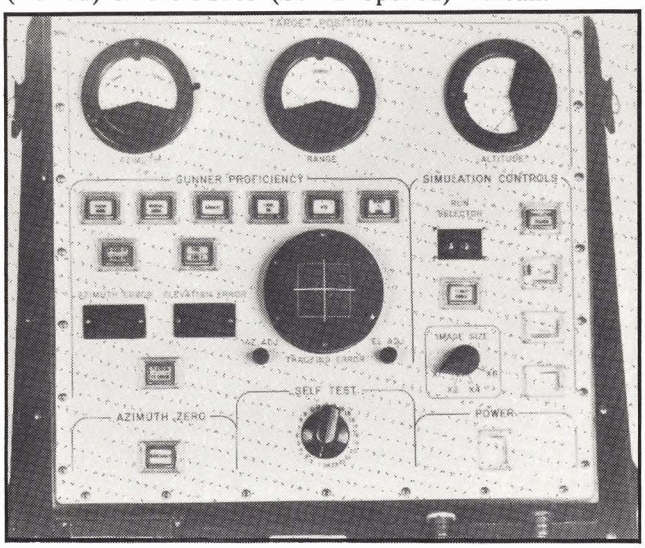
During the current phase of testing, the specific objectives are to:

- Provide reliability and shelf-life data for currently fielded Hercules missiles.
- Provide date to identify and verify the effects of equipment modifications on surface-to-surface firing performance.
- Validate revised and abbreviated firing tables and calculation procedures contained in FM 44-82A.
- Test the feasibility of using the direct-reading TDU with the short-method tables.
- Demonstrate system accuracy in the surface-to-surface mode at selected ranges.
- Demonstrate the lethality of the T45 warhead.

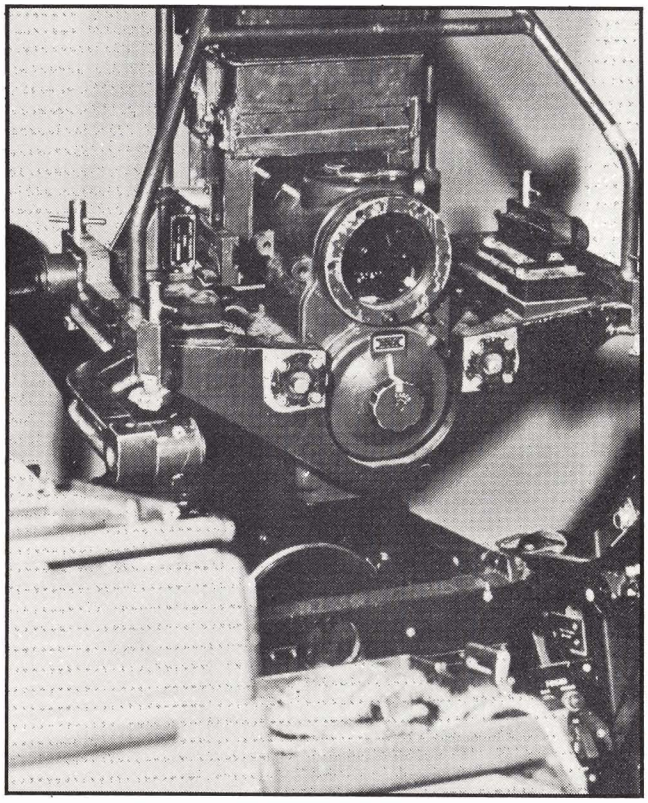
Although Nike Hercules firing in the surface-to-surface mode began over 14 years ago, these tests are demonstrating that it still has a role in the US Army inventory for the foreseeable future.

VULCAN GUNNER TRACKING EVALUATOR

A new training aid, the Vulcan gunner tracking evaluator (VGTE) (M-10), will soon be available for issue. The device will assist in training Vulcan gunners and aid in evaluating operator tracking efficiency by monitoring gunner performance against simulated aircraft targets. Intended for on-site training and gunner evaluation, it may be used with either the M167 (Towed) or the M163 (Self-Propelled) Vulcan.



VGTE Target Display Mount



Vulcan Gunner Tracking Evaluator Console

The VGTE is actually a target simulator consisting of a visual image generator which generates a moving image of a MIG-21 that is transmitted to a target display mount attached to the Vulcan sight. The MIG-21 image is then projected through a prism to the sight. The gunner tracks the target as it traverses the sight picture. A simulated target generator control console provides an evaluator capability by displaying gunner actions in terms of azimuth, elevation, and tracking error. Additional displays provide a readout of gunner mode selection (radar or manual), radar functioning, target lock, and the ready-to-fire indication. Allowance is made for ECM actions. Ninety-nine preset runs are available, and the evaluator may select target image size. An azimuth potentiometer mounts to the Vulcan turret and provides feedback to the control console on azimuth and elevation. The VGTE also has headphones for an audio link between the gunner and evaluator. When the gunner fires, the VGTE blanks out the target picture to simulate smoke obscuration.

Through use of the VGTE, Vulcan gunners may now train more effectively to maintain gunner efficiency.

SAM-D IS CHRISTENED "PATRIOT"

The Department of the Army has chosen the proper name "Patriot" for its new air defense system intended to replace both Hawk and Nike Hercules missile weapons. During early research and development, the system has been known simply by the acronym, SAM-D (Surface-to-Air Missile Development).

The new name becomes effective immediately.

"Official Army approval of a proper name is further evidence of the Army's commitment to develop and eventually deploy the Patriot system," said Major General Charles F. Means, Patriot Project Manager.

The Army assigns popular names to major equipment and weapons once approved for engineering development or deployment. Patriot was authorized to resume full-scale engineering development in February 1976.

ENLISTED CAREER NEWS

RECLASSIFICATION TO MOS 16P

Soldiers in grades E-5 and below requesting voluntary reclassification from their current PMOS to MOS 16P (Chaparral Crewman) as a result of the Army's elimination of the additional skill identifier (ASI) R6 from their combat arms MOS need not forward applications to MILPERCEN for reclassification, but a control number must be obtained prior to reclassification.

Although ASI R6 (Redeye Operations) will continue to be used until a sufficient number of Chaparral crewmen can be trained for that ASI, it was eliminated last December from MOS 11B, 11D, 11E, 12B, 13B, and 16R and is currently awarded to MOS 16P only. Soldiers affected by the elimination are permitted to reclassify to MOS 16P provided they are not receiving an enlistment or reenlistment bonus.

Reclassification control numbers may be obtained by contacting the Year Group Management Section of MILPERCEN's Enlisted Personnel Management Directorate at AUTOVON 221-8020, or commercial 202-325-8020. Additional details on the elimination of ASI R6 for these six MOS may be obtained by referring to MILPERCEN message 051200Z December 1975.

EERWA STATISTICS

Enlisted efficiency report weighted averages (EERWA) have been computed using data from the new enlisted and senior evaluation report forms. As of 31 March, the following averages are reported:

E-9	122.76
E-8	122.17
E-7	119.56
E-6	115.96
E-5	110.09
E-4	101.62
E-3	88.56
E-2	84.15
E-1	68.39

The next EERWA report is expected to be out in July.

QMP ALTERED

Enlisted soldiers approaching the 18-year mark should check the new QMP policy in Change 57 to AR 600-200. The change announces the 18-20 year zone as the "service tenure period." The intent is to give enlisted soldiers who have served faithfully for 18 years some assurance they won't be released before reaching retirement eligibility. This assurance does not mean substandard conduct or performance of duty in the last 2 years will be accepted. Soldiers identified for QMP action before reaching the 18-year mark will continue to be eliminated. Only those who had completed 18 years of active federal service at the time of the DA-imposed bar to reenlistment (regardless of current ETS) will be authorized to extend their enlistment at ETS in order to retire at the completion of 20 years of service.

HOMEBASE/ADVANCED ASSIGNMENTS

Soldiers in grades E-6 through 0-5 assigned on unaccompanied short tours overseas will now be notified before depature of the base to which they will return. The new policy — called homebase/advanced assignments — will return soldiers to their current CONUS location whenever possible. Because 18-24 months lead time is involved in determining return assignments, some changes may have to be made.

It is expected that many families will choose to remain at the "homebase" where the soldier sponsor is currently stationed rather than move elsewhere until the soldier returns. DA is studying the feasibility of allowing families in homebased Government quarters to stay in on-post housing until the sponsor returns.

The homebase/advanced assignment policy is designed to cut PCS family travel costs and give the soldier more time for personal planning.

The change will apply to Korea-bound enlisted soldiers E-6 through E-9 who depart CONUS after 1 July. After 1 October, it will aplly to all 12/13-month short tour areas for the top four enlisted grades.

On 1 January 1977, the policy will affect soldiers down through grade E-5 assigned to any 12/13-month short tour area.

MILESTONES - - CMF 16

MOS	SOLDIER'S MANUAL TO FIELD	SQT NOTICES TO FIELD	1st SQT ADMIN
16J	Now being distributed to field	Pilot—August 76 Record—May 77	Pilot—Oct 76 Record—Jul 77
16P	Oct 76	May 77	Jul 77
16R	Oct 76	May 77	Jul 77
16C	Nov 76	May 77	Jul 77
16H	Nov 76	May 77	Jul 77
16B	Dec 76	May 77	Jul 77
16E	Dec 76	May 77	Jul 77
16D	Jan 77	May 77	Jul 77
16Z	Sep 77	May 77	Jul 78
16F	TBA	TBA	TBA

In the January-March issue of AIR DEFENSE Magazine I talked about SQT's and Soldier's Manuals. Work is progressing according to the schedule that has been set by TRADOC. The milestones that have been set for CMF 16 are shown on the chart above. The dates shown for both the soldier's manuals and SQT notices are approximate and are subject to change. The SQT notice replaces the study guides that have been sent prior to taking the old MOS test. The one big difference between the two is that the SQT notice will inform a person as to the exact tasks on which he will be tested. Field validation of the SQT's is still being conducted. Plans and preparations are being made for teams from the US Army Air Defense School (USAADS) to visit both Germany and Korea to assist in the validation of the SQT's. When all the results of the field validation have been compiled and analyzed, the SQT's will be changed where necessary. In this way USAADS can field the best possible test.

In addition to the validation team going to Germany, CSM J. L. Jones — CSM, US Army Air Defense Center and Fort Bliss, will visit Germany this summer. He will brief the commands on EPMS and how it affects the ADA soldier.

The implementation date for the ADA maintenance field (CMF 27) has been slipped for 6 months. The current date for CMF 27 to come under EPMS is October 1977.

A new film explaining how enlisted soldiers' careers will be managed under EPMS is now available for use Armywide.

Peter Graves and Lynda Day George coanchor the 23-minute film, "Meet the System — An EPMS Special Report." Cast in a news show format, the film explains each aspect of EPMS from the "news room" and from the field. In addition, on-location interviews with EPMS planners and individual soldiers are conducted to detail how the system will help soldiers progress to the next higher EPMS skill level and to the next higher grade.

With each film, an Instructors Guide will be furnished to help the users prepare for EPMS briefings. Interested commanders, training NCO's, and service school instructors at all levels may obtain copies of the film from their servicing Audio-Visual centers by requesting film catalog number DO 0067.

FRANCIS R. PAVAO
SGM, DTD
US Army Air Defense School

BARS to STARS

OPMD UPDATE

NEW OFFICER PREFERENCE STATEMENT

A new, streamlined officer preference statement (DA Form 483), geared to the needs of OPMS and other developments, is now reaching the field. The single-page "dream sheet" reflects the change to a use of primary and alternate specialties which, under OPMS, have replaced branches.

The redesigned 483 simplifies the listing of geographic or duty assignment preferences and has expanded space for communicating with MILPERCEN assignment officers. Additionally, the new form gives the officer a place to list personal desires he wants considered in his next assignment, such as dependents' ages and whether he is renting, owns a home, or lives in Government quarters. This latter feature is related to the recently announced homebasing policy.

The new form also provides a professional development comments block that replaces three blocks of the old form which asked for a listing of desired schooling — military and civilian — and special career programs desired. Instructions for use of the new form ask officers to indicate their career preference and types of duty they feel best qualified for.

The new form is to be used as soon as it is received; the old form is obsolete. According to AR 614-100, officers are to complete a preference statement within 90 days after arriving at a new assignment and annually thereafter. Preference statements may be submitted at any time officers want to make their latest wishes and other information known to MILPERCEN.

OFFICERS URGED TO REVIEW OFFICIAL FILES

Officers in recently announced zones of consideration are encouraged to audit their official military personnel files (OMPF) before selection boards see them. OMPF's are used to select officers for promotion, military and civil schooling, RA appointment, retention, elimination, and recall to active duty. They provide a complete historical record of service.

Recent promotion board members have said many officers obviously are ignoring audit of official files. Although MILPERCEN prepares files for selection board use, DA officials offer this advice on how officers should get involved in the process:

- Make sure the official photo in your file is current — check AR 640-30.
- Follow-up your last ORB audit. Insure your personal data are correct.
- Review your OMPF:
  - — Be sure your last OER is in your file.
  - — Are you due an OER before the board convenes?
  - — Purge your file of unnecessary documents.
  - — Insure everything in your file is yours.
  - — Are you missing on OER? Contact MILPERCEN to take action to reconstruct or obtain any missing report

Officers should request appointments for OMPF review as far in advance as possible — at least 2 full workdays. Call AUTOVON 221-9618.

DA is currently reconvening 1974-75 AUS promotion boards for senior warrant officers, majors, and lieutenant colonels after a Secretary of the Army decision to grant officers considered by these boards additional promotion opportunities. As a result, some officers — lieutenant colonels and below — may have difficulty reviewing their official files during the rest of this year since the 74-75 boards are being conducted in addition to normal 1976 selection boards. Officers whose records are being reviewed by the 74-75 boards will have to schedule review appointments after these boards finish with them. Exceptions will be made for officers in PCS transit status.

Keeping official files up-to-date is a team effort. MILPERCEN does all it can to prepare files for selection boards, but individual officers also have to involve themselves in the process.

AVIATORS SPECIALTY SELECTION

MILPERCEN has started to identify commissioned aviators to be considered for redesignation into aviation, specialty 15 — the newly approved OPMS advanced entry specialty. Records of about 5,500 aviators with at least 7 years active commissioned service as of June 30, 1975, will be reviewed.

Once the records have been reviewed, Officer Personnel Directorate career divisions will determine tentatively the combination of OPMS specialties considered best for future designation. During March, each aviator was advised by letter of the tentative designations and will be asked to agree — or list alternate preferences. These factors will be considered by the board in making the final designations. By the end of June, commissioned aviators will have been informed of the two specialties in which they should expect future management.

Once redesignated into the aviation specialty, officers will be managed in aviation and one other OPMS specialty. Those not selected for the aviation specialty will continue to be managed in their currently identified alternate specialties.

Since OPMS primary and alternate specialties have been designated for all rated officers in year groups 1968 and earlier, those selected for the new aviation specialty will have to substitute it for one of their two currently designated specialties.

Redesignation into the aviation specialty depends on:

- Army requirements.
- Utilization standards under the Aviation Career Incentive Act.
- Experience and potential in all specialties under consideration.
- Year-group strength requirements.
- Officer preference for aviation specialty designation.

Projections based on the current number of aviators and training rates indicate many field grade aviators will be redesignated into the aviation specialty. Current projections also indicate that about 50 percent of the eligible captain aviators from the aviation overstrength year groups 1966-1970 will be designated into the specialty. Virtually all aviators in year groups 1972 and later will be designated into aviation at the 8-year point.

Aviators, including those involuntarily precluded from having aviation as one of their OPMS specialties, will be entitled to continuous monthly flight pay for the first 12 years of aviation service if they pass an annual flight physical and written test and do not request indefinite suspension from flight status.

Although no aviator can be guaranteed making pay gates beyond the twelfth year of aviation service, those selected for the aviation specialty will have the best opportunity of meeting the gates since they will be managed into positions calling for qualified commissioned aviators.

Some officers — especially in the combat arms — selected for the aviation specialty will have to give up a branch-related specialty in which they are already considered proficient. However, their officer record briefs will be annotated to reflect that they have attained sufficient experience in the previously designated specialty to be considered for assignment in job-related areas. They will also be eligible to seek command in the previous specialty.

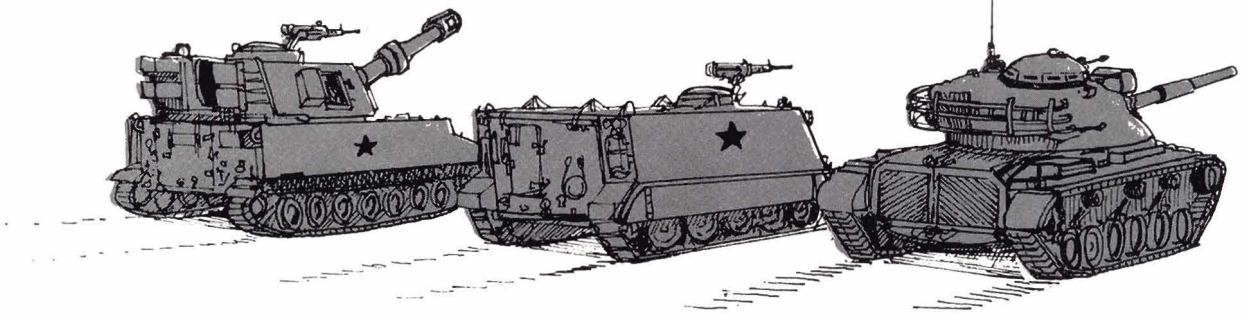
The MILPERCEN redesignation action will have little impact on officers previously designated in the basic entry specialty of aviation materiel management — specialty 71.

ADA POINTS OF CONTACT

Following are changes in ADA points of contact that have occurred since the list was published in the October-December 1975 issue of Air Defense Trends.

Warrant Officers Division	
Chief, COL Roy J. Shirley	221-7831
Company Grade Combat Arms Division	
LT assignments, MAJ James L. Smith	221-0115/0117
Civil Schools, MAJ Edward R. Bryan, III	221-7818
Lieutenant Colonels Division	
Chief, Professional Development, LTC Robert W. Harris	221-0752/0753
Colonels Division	
Chief of Assignments, COL Joseph D. Ryan	221-7873

COMBINED ARMS CORNER



HELLFIRE MISSILE SYSTEM

The Army Missile Command (MICOM) has received Department of Defense approval to begin engineering development of the laser Hellfire Missile System, planned as the primary armament on the Army's Advanced Attack Helicopter against hardpoint targets. Emphasis will be on a modular design of the 7-inch diameter missile to accommodate future terminal homing seekers.

MICOM has studied and evaluated both 6- and 7-inch missiles, and is participating with the US Air Force in the development of a laser homing seeker.

Approval for the Hellfire program climaxes 3 years of advanced development by the Army and two contractors. During that time, MICOM in-house laboratories conducted extensive tests at Redstone with a prototype of the laser-guided tank killer.

MICOM has demonstrated Hellfire's accuracy and versatility with rapid and ripple test firings, using direct and indirect launches from the ground and from helicopters, against both stationary and moving targets. Army combat soldiers from the Armor and Aviation schools fired several missiles. Five Hellfire-equipped aircraft were tested in operational wargames for a period of 3 months to obtain key system performance data.

The Hellfire Project Office currently is preparing to send requests for proposals to industry to solicit their detailed approach for full-scale development of the Hellfire system. The Army will evaluate the contractor responses and select one contractor for full-scale engineering development.

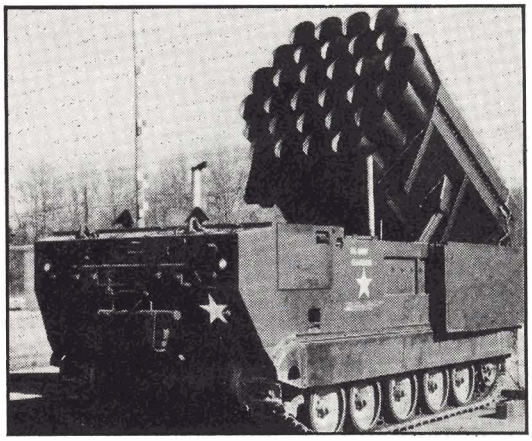
Hellfire, the first weapon designed especially for helicopter launch, will provide the Army with a family of terminal homing seeker modules and a common airframe to engage a variety of tank and hardpoint targets.

Laser guided missile firing at Restone Arsenal.

WEAPON SPOTTER. The US Army's new Mortar Locating Radar has accurately located "hostile" weapons firing mortar and artillery shells in a live-fire "shoot-off" at the Army Proving Grounds at Yuma, Arizona. The system, contained in two lightweight modules, can be quickly moved to forward battle areas by aircraft, helicopter, or a Gama Goat vehicle (left). The operations shelter is mounted in the Gama Goat and the antenna is folded flat on a trailer. In previous tests at Yuma, the system demonstrated the ability to detect and locate artillery pieces and rocket launchers as well as mortar weapons.

NEW METHOD TO CLEAR MINEFIELDS

A new system named "SLUFAE" (Surface Launched Unit, Fuel Air Explosive) will be employed by combat engineers to breach minefields at ranges up to 1,000 meters in support of attack and pursuit operations. SLUFAE is being designed as a quick-response, all-weather, day or night system, consisting of a 30-tube armored rocket launcher mounted on an M548 tracked cargo carrier. Capable of single or variable ripple fire, the system launches a fuel air explosive round that disperses a load of highly volatile chemicals into aerosol clouds over the target area. Detonation of the clouds produces a concussion effect that neutralizes or detonates landmines and explosive "booby traps." System development is a result of a cooperative Army-Navy research effort; however, MICOM will probably assume program management when the system goes into final production.



LIGHTWEIGHT COMPANY MORTAR SYSTEM

A directorate for the lightweight company mortar system (LWCMS) test is now operational. The Infantry Board provided the Test Director and several officers and noncommissioned officers for this OTEA-sponsored test which is being conducted at Fort Benning. Data obtained will be used to assess the operational effectiveness and military utility of the LWCMS.

The operational test will be conducted in three phases: training, field exercise, and a supplemental live-fire exercise. It will compare the LWCMS with the existing 81-mm mortar system.

Phase I will use trained personnel to develop base comparison data with the 81-mm mortar and to conduct retraining with the LWCMS to include administering the gunner's examination.

Phase II will use mortar platoons in tactical exercises to address transportability, weapon emplacement, fire adjustment, and FDC procedures during varied terrain exercises and under differing weather, visibility, and tactical situations.

Phase III will be a separate supplemental live-fire exercise for a side-by-side comparison of the two systems to determine system accuracy and effectiveness.

—Infantry

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DEVELOPMENTS

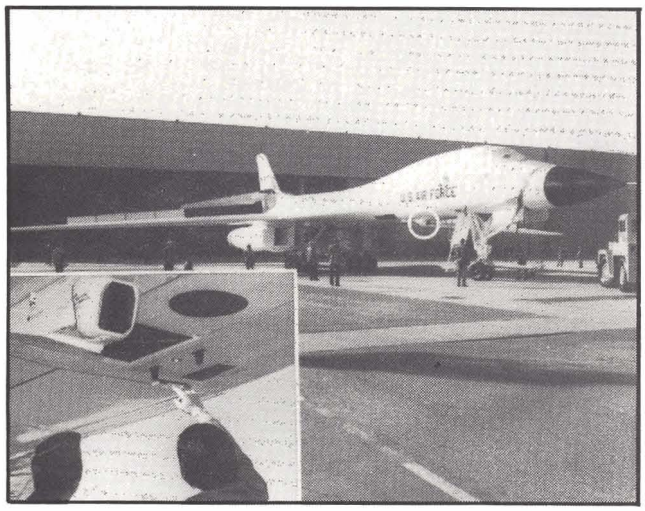
B-1 BOMBER'S HEAT SENSOR SEES IN DARK

Day or night in almost any weather condition, US Air Force B-1 bomber crewmen will be given a television-like image of terrain ahead of their supersonic aircraft by a FLIR (Forward-Looking Infrared) device built by Hughes Aircraft Company. Three preproduction B-1 FLIR's have been built for the bomber.

Air Force B-1 prototype number two, the first to be equipped with the temperature-sensing viewing system, was formally rolled out in January and has begun tests.

The FLIR measures difference in temperature being radiated by objects rather than the amount of light they reflect as does the human eye. A processor converts these temperature differences into light and dark patterns that are assembled into a television-like image of the terrain ahead of the speeding aircraft. This image is displayed on a cockpit monitor. The information is also fed into the aircraft's other avionics systems.

The B-1 FLIR will be as effective as the FLIR on the B-52 but will be only half the size and weight.



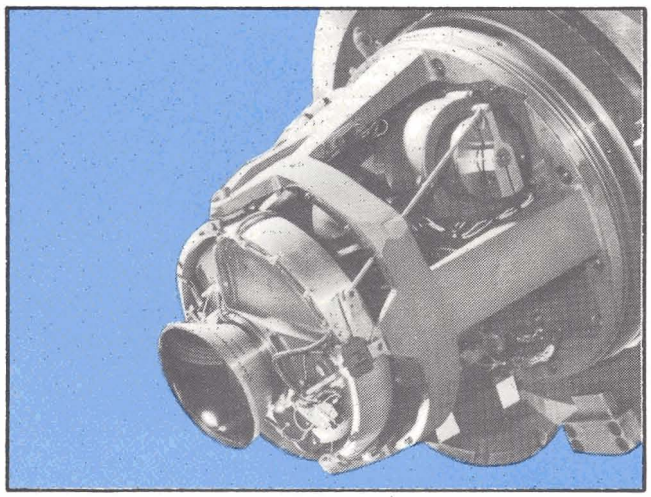
Shown here on the US Air Force Prototype B-1 bomber is the forward-looking infrared device. (FLIR).

NEW IR MAVERICK

The first US Air Force Maverick missile equipped with a new imaging infrared seeker recently guided itself to a direct hit on a tank. The new imaging infrared (IIR) seeker was developed under contract with Hughes Aircraft Company to give the air-to-ground Maverick a day-night capability under a wide variety of target conditions.

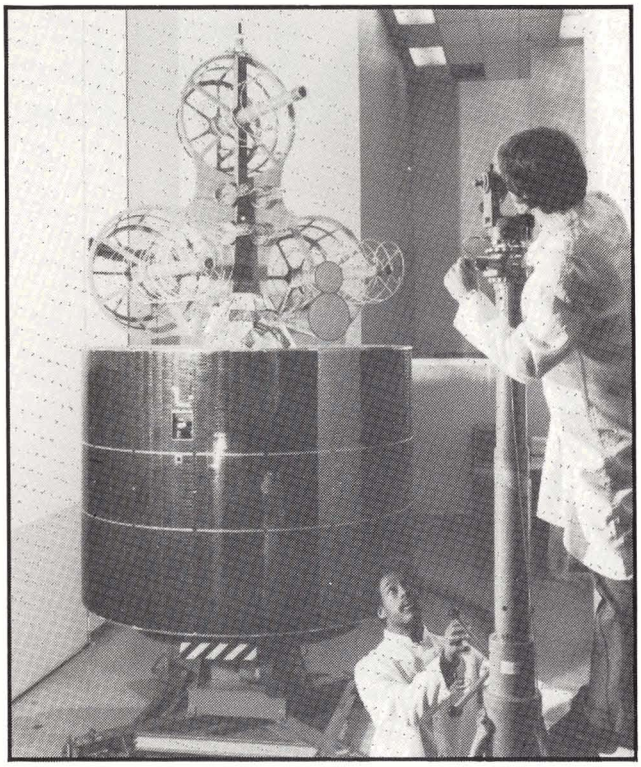
The seeker has the ability to scan a scene somewhat as a TV camera does and produce an image by sensing the small differences in infrared heat radiated by objects in view. Because IIR does not require light, it produces an image as well in total darkness as during daylight. It is compatible with a number of Air Force and Navy missiles and glide bombs.

A new laser seeker for the Maverick will soon be tested providing an alternate guidance system that homes on a laser beam reflected off a target by a forward air observer or ground spotter.



The new imaging infrared seeker which has been perfected for guiding the Air Force's Maverick missile to its target.

MARITIME SATELLITE



This new maritime satellite will relay communications between ship and shore for the US Navy and international maritime shipping.

The world's first commercial maritime telecommunications satellite, designed to provide instant ship-to-shore communications for US Naval forces and merchant marine vessels on the high seas, was recently launched by NASA. The satellite, called Marisat, is the first in a new series of synchronous orbit communications satellites designed to relay high quality voice, telex, facsimile, and data over the Atlantic and Pacific oceans for the international maritime industry and mobile offshore operations. It will also serve the Navy's fleet communications requirements.

Ship captains now must wait 8 to 20 hours to receive a radio message. However, after successful launch of Marisat, ships outfitted with special receiving terminals no longer need rely on Morse code or voice communications by standard shortwave radio, which are subject to severe fading and interference by poor weather and ionospheric disturbances.

Ultrahigh frequency communication circuits on the new satellite have been leased by the Navy for interim space communications support of the US Fleet until the Navy's Fleetsatcom system becomes operational.

When on station, the Atlantic Marisat will serve an area of 60-million square miles, embracing about one-third of the earth. Its coverage will extend across the Atlantic from the east coast of the United States and all of Central and Latin America to the western portions of the Indian Ocean and as far east as the Gulf of Oman, which laps at the shores of Iran and Saudia Arabia.

IPD/TAS TESTING

The U.S.S. Downes is testing the Improved Point Defense/Target Acquisition System (IPD/TAS).

A new defense against one of modern naval warfare's deadliest threats — the low-flying, fast-approaching antiship missile that pops up over the horizon — is now undergoing operational sea trials aboard the destroyer escort U.S.S. Downes. Two-thirds of the way up the Downe's mast can be seen the narrow, rectangular face of the radar antenna integral to the new system called IPD/TAS (Improved Point Defense/Target Acquisition System). The system reacts automatically to airborne threats in any type of weather and within seconds designates valid targets to the ship's defensive guns and missiles. IPD/TAS is the first system to integrate infrared sensors with conventional radar and correlate the returns from both. The IR sensor, mounted directly behind the radar antenna, provides target elevation data to supplement the returns from the new high-data rate radar. The IR operates passively when radar silence is required. Identification, friend-or-foe equipment is integrated in the system to separate friendly activity from hostile or unknown threats.

AIR DEFENSE Book Review

GOEBBELS The Man Who Created Hitler, by Viktor Reimann. (Translation from the German by Stephen Wendt.) Publisher: Doubleday and Company, Garden City, New York, 326 pages, $12.50.

The author does well in presenting a vivid portrayal of Goebbels' life from young manhood — a work that must have required years of diligent research. He sets the stage for the story by pointing out that Germany was ripe for radicalism when Hitler and Goebbels came upon the scene. After World War I, Germany was in a state of spiritual unrest, looking upon herself as a slave nation — a slave to the convenants of the Treaty of Versailles. She needed a "Savior." In this setting, Goebbels, a struggling student of journalism, meets Hitler, a struggling member of an insignificant National Socialist Party, and sees in him the Savior image. From that time on, he bent all his energy and cunning toward elevating Hitler to the top authority in all of Germany. Whatever Goebbels' destiny might otherwise have been, his molding of the Hitler image is the thing that actually determined his destiny. Hitler became his "God" and the higher his propaganda boosted Hitler, the higher he himself rose in the Nazi Party, eventually becoming Propaganda Minister along with several other top positions.

Goebbels is described by the author as a propagandistic genius and he goes on to show the accuracy of this assessment. Even though in his basic makeup Goebbels held contempt for the world and society, his oratory had an almost magical effect on people, and throngs came to listen. It was this gift and his genius for stirring public support that enabled him, along with Hitler's political maneuverings, to bring Germany to a point in 1933 where Hitler and the Nazi Party seized control of the nation.

Mr. Reimann describes fully the erosion of personal freedom as the tentacles of dictatorship grew until people were virtual slaves. While refraining from repulsive details, he also describes the horrors of torture and death dealt to many of Hitler's political enemies and the Jews. But the masses of German people were taken in — "hypnotized" by their Fuehrer's and Goebbels' propaganda.

Failing in any effective foreign policy, it was inevitable that Hitler would become the aggressor and eventually plunge the country into war. Goebbels was able to keep public morale high even after serious setbacks occurred. When Allied bombers began striking German cities, he was able, through his genius, to overcome discouragement and bolster the people's belief that Germany could not lose the war. Even when the Third Reich was near collapse, he was able to control the optimism of the populace, and he still fostered complete grandiosity of Hitler.

But as the Allies gained strength and the Fatherland was invaded, it became clear that total defeat was near at hand. In those most difficult times, the author, whether intentionally or not, brings out the fact that the little man had real courage. He stood the test of repeated disasters with much more stamina than the broken Hitler and his other Party leaders. Until only a few days before he and Hitler took their own lives, he published words of courage and hope for the German people. In these writings he predicted for all German people what has come to pass in West Germany: prosperity, a bright future, and an honorable relationship with her European neighbors.

Mr. Reimann's book provides very interesting and informative reading based on facts surrounding a man whose deeds have had a profound effect on the world as it is today. It is especially interesting to people wanting to gather intricate details connected with World War II in Europe.

The Editor Comments

In this issue of *AIR DEFENSE* we've inclosed our Annual Readership Survey form as a loose-leaf insert. This year's survey is intended to be easy and convenient for all of our readers to fill out. The few minutes you take to mark your survey and drop it into the mail box will be most appreciated by the *AIR DEFENSE* staff. The "feedback" we get from you lets us know which directions to take during the coming year. Your ideas, criticisms, suggestions, and opinions guide us as we work to produce for you a valuable and useful ADA branch journal that is not only interesting but professionally productive. After the completed survey forms have been received and the data tabulated, we'll print the results in an upcoming issue of *AIR DEFENSE*.

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